ULTRASONOGRAPHIC PLACENTAL THICKNESS - ITS CORRELATION TO GESTATIONAL AGE

Dissertation Submitted to

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY

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For award of the degree of

M.S (OBSTETRICS&GYNAECOLOGY)
BRANCH – II

ESIC Medical college & PGIMSR
K.K.Nagar,Chennai

THE TAMILNADU

DR. M.G.R MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

APRIL 2016

BONAFIDE CERTIFICATE

This is to certify that dissertation titled **"ULTRASONOGRAPHIC PLACENTAL THICKNESS - ITS CORRELATION TO GESTATIONAL AGE"** is a bonafide work performed by **Dr.M.VINODHA,** post graduate student, Department of Obstetrics & Gynaecology, ESIC Medical College & PGIMSR, Chennai-78, under my guidance and supervision in partial fulfillment of regulations of The Tamilnadu Dr. M.G.R Medical University, Chennai for the award of M.S. Degree during the academic year 2014 - 2016.

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This is to certify that the dissertation titled **"ULTRASONOGRAPHIC PLACENTAL THICKNESS - ITS CORRELATION TO GESTATIONAL AGE"**is a bonafide research work done by **Dr.M.Vinodha,** in partial fulfilment of the requirement for the degree of M.S (Obstetrics & Gynaecology) Branch – II.

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I solemnly declare that this dissertation titled **"ULTRASONOGRAPHIC PLACENTAL THICKNESS - ITS CORRELATION TO GESTATIONAL AGE"** has been done by me at ESIC Medical College & PGIMSR, Chennai, under the guidance and supervision of **Dr.K.MYTHILI, MD, DNB., (O&G),** Associate Professor, Department of Obstetrics & Gynaecology, ESIC Medical College & PGIMSR, Chennai. This dissertation is submitted to **The Tamil Nadu Dr.M.G.R. Medical University, Chennai** in partial fulfillment of the University regulations for the award of the degree of **M.S. Branch - II (**Obstetrics & Gynaecology**)**.

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Dr.M.VINODHA

CERTIFICATE OF APPROVAL

To

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Dear Dr. M. Vinodha,

The Institutional Ethical Committee of ESIC Medical College & PGIMSR reviewed and discussed your application for approval of the proposal entitled **"Ultrasonographic Placental Thickness - its Correlation to Gestational Age"** at ESIC Medical College & PGIMSR, K K Nagar, Chennai 600 078, No. **06/27/10/2014**.

The following members of the Ethical Committee were present in the meeting held on 27.10.2014 conducted at ESIC Medical College & PGIMSR, KK Nagar, Chennai-78.

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The proposal is approved to be conducted in its presented form.

The Institutional Ethical Committee expects to be informed about the progress of the study and significant adverse effects occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

[DR. A.V. SRINIVASAN]
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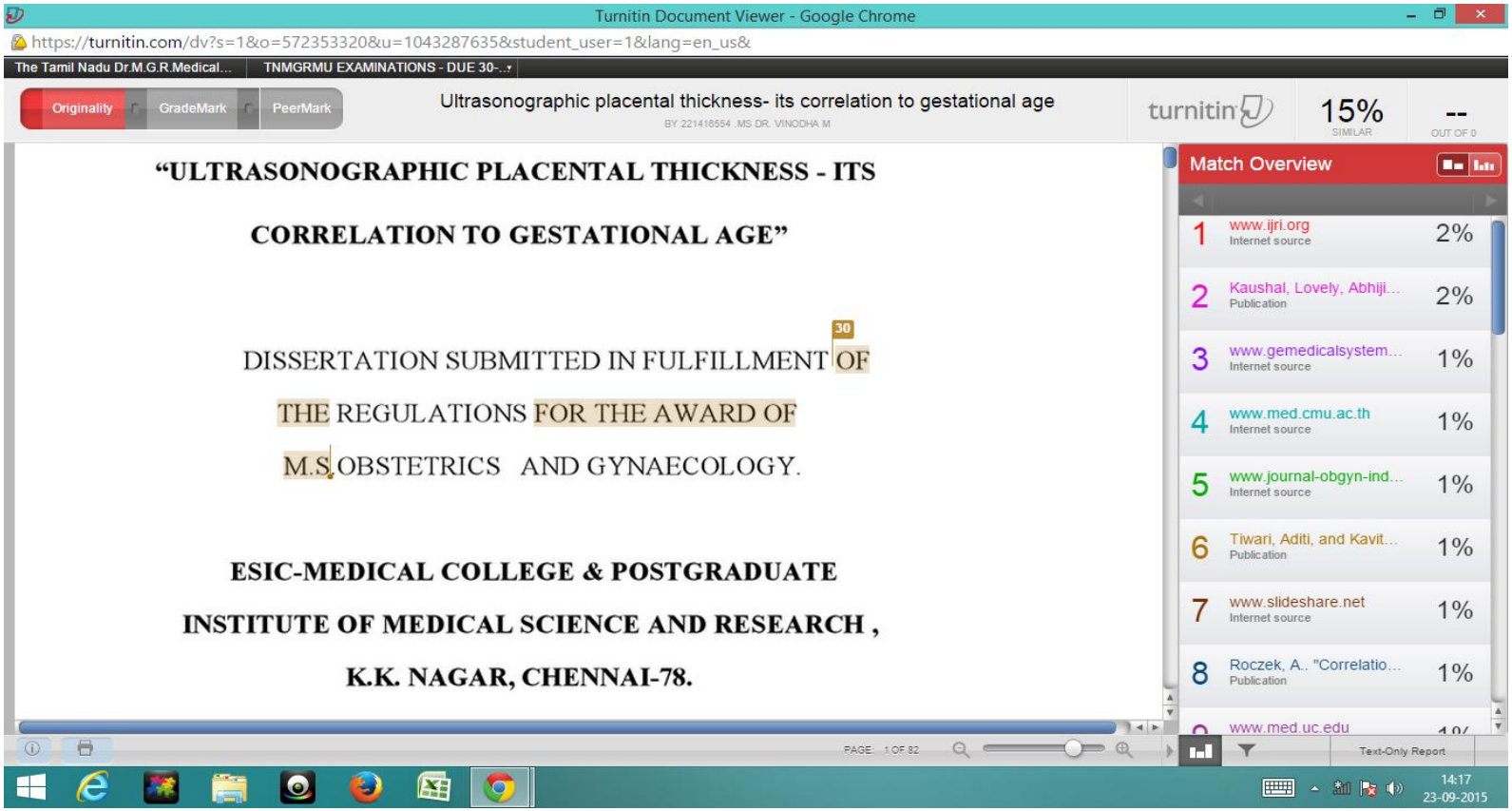
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INTRODUCTION

Estimation of correct gestational age is very important in modern obstetrics as any procedure or intervention is mainly dependant on gestational age. Gestational age is the most important criteria in decision making in managing high risk pregnancies.

Correct estimation of gestational age lies on the relevant menstrual history, first trimester pelvic examination, date of quickening and first trimester USG parameters.

A women's menstrual history becomes reliable only if,

1. She regularly menstruates.
2. She is able to recall her LMP.
3. There is no recent use of OCPills within 3 months of her LMP.

Menstrual history is unreliable if,

1. The cycles are irregular.
2. She conceives during lactational amenorrhoea.
3. LMP is not known.

Unfortunately approximately 50% of women are unable to recall their LMP[1]. In cases of ART successful pregnancies the date of embryo transfer can be used for calculating EDD.

How old is the fetus, is the first question that comes to an obstetrician's mind whenever a pregnancy has to be intervened.

Since ancient times it is customary to divide pregnancy into 10 lunar months or 9 calendar months with 3 trimesters of 3 calendar months each based on the fact that certain major obstetric complications occur in a particular trimester. In modern obstetrics the clinical use of trimesters to describe a specific pregnancy is inaccurate.

Accurate knowledge of fetal age has become the basis for ideal obstetric management and has came into practice the most appropriate unit called weeks + days of gestation dividing each trimester into 14 weeks, First trimester being first 14 weeks, 2nd trimester being 15-28weeks, 3rd trimester being 29-42weeks.[2]

It was sir Neageles, a German obstetrician who first commented on the average duration of pregnancy and according to Naegele's rule, in women who regularly ovulate and menstruate every 28 days the mean duration of pregnancy is 280days or 40 weeks from the last menstrual

period and the expected date of delivery is calculated by adding 1 year and 7 days and counting back 3 months from the date of LMP.

Even though Naegele's rule is universally applied as the first tool to assess gestational age, there are certain flaws which limit its clinical use in major decision making. According to Naegele's rule gestational age calculated by this way assumes pregnancy to have begun 2 weeks before ovulation which is not the real fact. Only 4% of women deliver on EDD calculated by the Naegele's rule. Mat Su moto et al reported approx 20% of population have early or late ovulation[3].

Naegele's rule cannot be applied for unreliable cycles with irregular menstrual histories. In that case, Parikh formula is applied,

Parikh formula-Add 9 months to LMP, subtract 21 days from it and then add the duration of the previous cycles.[4]

Bergsjo et al found that the mean duration of pregnancy was 281 days with a standard deviation of 13 days.[5]

CRITERIA TO ESTIMATE THE RELIABILITY OF EDD:[6]

Reliability of EDD:

Excellent dates

1. Patients with adequate clinical information (known, normal, LMP 28 – 30 days cycles; no recent use of OCP; uterine size in agreement with dates) plus ultrasound examination between 16 & 24 weeks indicating that the fetal measurements are in agreement with the clinical estimation of GA.

2. Patients with the inadequate or incomplete clinical information but with two ultrasound examinations between 16 & 24 wks showing linear fetal growth and similar EDD.

Good dates

1. Patients with adequate clinical information (as defined above) and one confirming ultrasound examination obtained after 24 weeks of gestation.

2. Patients with inadequate or incomplete clinical information and two or more ultrasound examinations showing adequate growth and similar EDD.

Poor dates

Any clinical situation different from those listed above.

Other clinical parameters apart from the period of amenorrhoea for assessing gestational age like

1. Date of single coitus.
2. Date of quickening.
3. First trimester pelvic examination.
4. Uterine fundal height.
5. Symphysio Fundal height.
6. Lightening.

Are all considered to have lost importance as they are not evidence based and they have high error rates varying from 2-6 weeks.

Date of Quickening:

20 weeks added to the date of quickening in primigravida and 22 weeks added to the date of quickening in a multigravida gives the probable date of confinement.

McDonald's Rule:

Height of the fundus is measured by a flexible tape and duration of pregnancy is calculated from

Ht of fundus (cm) x 2/7 = duration of pregnancy in lunar months

Ht of fundus (cm) x 8/7 = duration of pregnancy in weeks

Symphysiofundal height:

When measured from the uterine fundus to the symphysis pubis, Symphysiofundal height in cm roughly corresponds to gestational age from 20 to 34 weeks.

Abdominal Girth Measurement:

Abdominal girth measured at 30 weeks is 30 inches and thereafter it increases by 1 inch per week.

Urine pregnancy test kits now available in the market are very sensitive that they can detect urine beta hCG of more than 25 IU/L, if a women has positive urine pregnancy test as soon as she misses her period then the dates are reliable. A healthy pregnancy will have a ß-hCG value of 50 to 100 IU/L on the day of missed period.[7]

Errors in the calculation of EDD and clinical methods bear a profound effect on the developing fetus leading to iatrogenic prematurity or postmaturity.

Complications of a preterm baby are:

- ✓ Asphyxia
- ✓ Hypothermia
- ✓ Pulmonary syndrome which includes RDS
- ✓ Intraventricular hemorrhage / Cerebral hemorrhage
- ✓ Hypoglycemia
- ✓ Infection
- ✓ Exaggerated physiological jaundice
- ✓ Persistent PDA
- ✓ Sudden infant death syndrome
- ✓ Retinopathy of prematurity

Longterm complications like cerebral palsy, hearing loss, chronic lung disease and Attention deficit hyperactive disorder are observed.

Postterm babies on the other end are not without complications. The complications are:

- ✓ Increased perinatal mortality due to uteroplacental insufficiency, meconium aspiration and oligohydramnios.

- ✓ Fetal asphyxia during labour because of cord compression or uteroplacental insufficiency.
- ✓ Meconium aspiration.
- ✓ Postmaturity syndrome as described by Clifford.
- ✓ Fetal macrosomia and subsequent trauma.

Considering the adverse neonatal outcome of a preterm or a post term labour it is mandatory to have an ideal tool which can accurately assess the gestational age and help in terminating high risk pregnancies at an appropriate gestation age and hence came into light the ultrasound.

Ultrasound has revolutionized modern obstetric practice and has become the standard tool of assessing gestational age for the past two to three decades.

Lot of parameters are there as a tool for assessing gestational age.

FIRST TRIMESTER:

Table1: Ultrasound milestones in normal early pregnancy development: The order of appearance is[7]

Gestational Age	Mean Sac Diameter (mm)	Crown Rump Length (mm)	Ultrasound Imaging Feature
4 Weeks			Thickening of the endometrium and decidua
4 to 5 Weeks			Gestational sac: appears as an echo-genic ring in the deciduas, usually placed eccentrically
5 Weeks	8 mm		Yolk sac
5 to 6 Weeks	20 mm	1-2 mm	Fetal pole/embryo
6 Weeks	25 mm	5 mm	Fetal cardiac activity

PARAMETERS IN SECOND AND THIRD TRIMESTERS:

- ✓ Biparietal diameter
- ✓ Abdominal circumference
- ✓ Head circumference
- ✓ Femur length

The accuracy of these parameters declines as the gestational age increases.

Accuracy in the first trimester ± 5 days, second trimester is ± 1 or 2 weeks and third trimester ± 2 to 3 weeks.

USG Estimation of the Ossification Centre :

Abilash sandhya et al[8] studied the usefulness of ultrasound identification of distal femoral epiphysis and proximal tibial epiphysis in gestational age estimation. Presence of distal femoral epiphysis can be seen as early as 29 weeks. It is seen in almost all foetuses at 33 weeks.. It is both 95% sensitive and specific. Presence of proximal tibial epiphysis has a 95% positive predictive value for a gestational age greater or equal to 35 weeks. On correlating the presence of ossification centres of femur, tibia and humerus along with BPD, HC, AC and FL, the wide variation in third trimester could be further narrowed down.

So other Ultrasound parameters like

1. Fetal Kidney length.
2. Transcerebellar diameter.
3. Foot Length.

4. Clavicle Length.

5. Chest Circumference.

6. Binocular Distance are under study.

This study was undertaken to evaluate the reliability of placental thickness as a parameter to estimate gestational age.

AIMS AND OBJECTIVES:

To study the correlation between ultrasonographic placental thickness and gestational age of the fetus.

To determine normal sonographical placental thickness for various gestational ages.

REVIEW OF LITERATURE

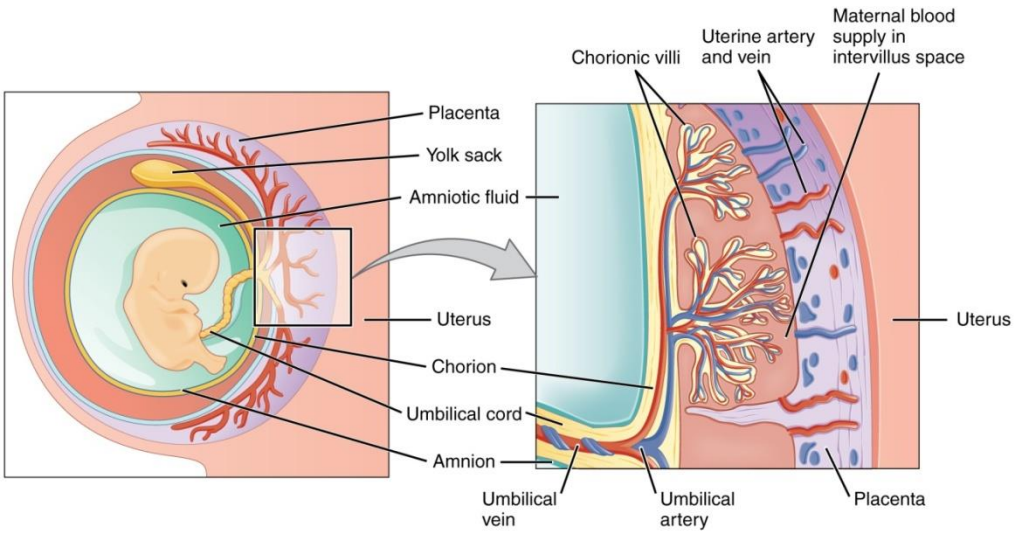
The placenta is a maternofetal organ with important metabolic, endocrine and immunological functions. Placental formation starts a little later than the fetus, from the 13th day onwards and is usually completed by 4th month. It grows throughout pregnancy. It reaches its maximum growth at term. Placenta is primarily a fetal organ and its size is a reflection of fetal health and size**. Nyberg and Finberg in 1990** reported in their study that as a rule of thumb placental thickness in mm parallels gestational age in weeks[9].

Until recently the fetoplacental unit could only be assessed clinically and biochemically. Now sonography has provided a safe and non invasive means to evaluate fetus and placenta. Besides several fetal parameters like CRL, BPD, HC, AC, FL, Placental thickness measured at the level of umbilical cord insertion can be used as a new parameter for estimating gestational age.

Human placenta is discoid, due to its shape; hemochorial because of direct contact between the maternal blood and chorion and deciduate, as maternal tissue is shed at parturition. Placenta connects mother and the fetus via the umbilical cord. Placenta has two surfaces maternal and fetal.

Fetal surface is smooth and the maternal surface shows about 15-20 cotyledons or lobes.

FIGURE 1: STRUCTURE OF THE PLACENTA



The placenta has 2 components,

Maternal portion- the decidua basalis formed by endometrial surface and the fetal portion which develops from chorion frondosum.

The fetal chorion is the fusion of the trophoblast and extra embryonic mesenchyme. There are 2 types of trophoblastic cells, the syncytiotrophoblast and the cytotrophoblast.

The major functioning unit of placenta is the chorionic villous. Within the chorionic villous are the intervillous spaces. The maternal blood enters the intervillous spaces. As the embryo and the membranes grow, the decidua capsularis is stretched, the chorionic villi on the associated part of

the chorionic sac gradually atrophy and disappear (chorion leave). The chorionic villi related to the decidua basalis increase rapidly in size and complexity (chorion frondosum).

The maternal surface of the placenta which lies contiguous with the decidua basalis is termed the basal plate. The fetal surface which is contiguous with the surrounding chorion is termed the chorionic plate.

At term the placenta is about 15–25cm diameter, measures about 3cm in thickness and weighs about 600g.[10] Length of fetal capillaries at term is 320 kilometer and the surface area of the syncytiotrohoblasts is about 12m2.

Placental circulation:

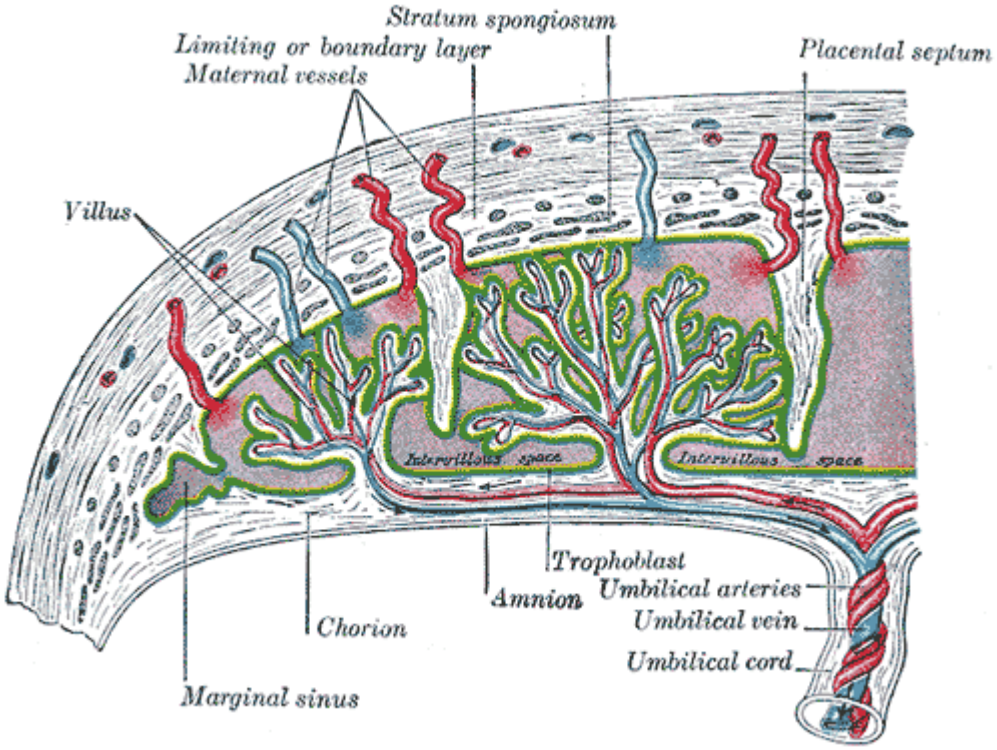
Vascular supply to the placenta is unique as it receives blood from both the mother and fetus and thus has two separate circulatory systems.

Maternal placental circulation:

The spiral arteries of the uterus undergo remodelling and become straight and widened. Through these vessels maternal blood fills intervillous space of placenta and bathes fetal villi in blood allowing for gas exchange.

Even though maternal blood comes into direct contact with fetal chorion there is no exchange of blood. Placental barrier does not allow intermingling of blood. Deoxygenated blood enters the endometrial veins. Maternal blood flow is 600-700 ml at term.

FIGURE 2: PLACENTAL ANATOMY:

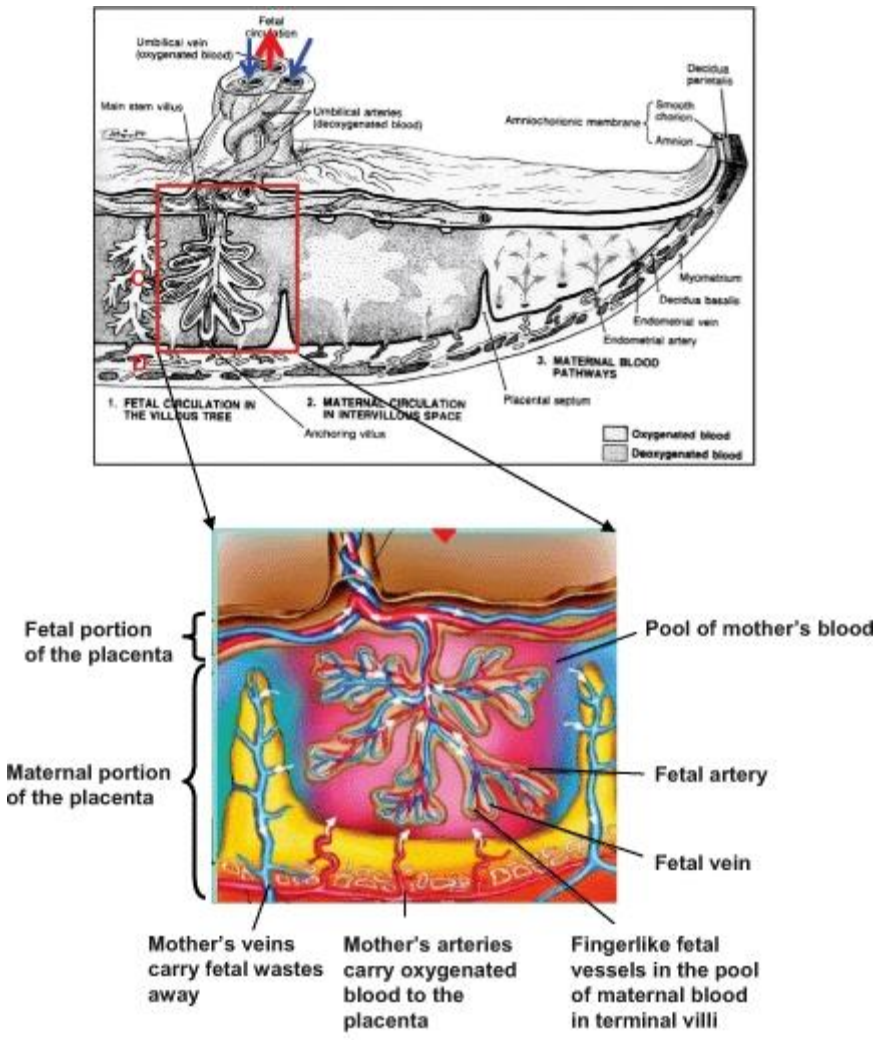


Fetoplacental circulation:

The two umbilical arteries carry the impure blood from the fetus. They enter the chorionic plate below the amnion and supply the corresponding half of the placenta. They branch into smaller arteries and

finally form the primary, secondary and tertiary vessels of the corresponding villi. Blood flows to the corresponding venous channels. The maternal and the fetal blood flow in opposite directions creating a countercurrent which facilitates exchange of materials between the mother and the fetus. Fetal blood flow to placenta is 400mL/min.

FIGURE 3: BLOOD FLOW THROUGH THE PLACENTA:



The arrows indicate the direction of blood flow

Circulation in intervillous space:

The arterial blood enters villous space under pressure. There is lateral dispersion after reaching the chorionic plate. Villi help in mixing and slowing of blood. Spiral arteries are perpendicular and veins are parallel to the uterine wall. This arrangement helps in the forcing of arterial blood into the intervillous space during a contraction while the veins are occluded. Hence large volume of blood is available for exchange even during a contraction. Endothelin and prostanoids cause vasoconstriction while nitric oxide causes vasodilation in placental circulation.

Functions of placenta:

- ✓ Transfer of nutrients and oxygen to the fetus .Conditions like maternal diabetes or anemia can increase or decrease the supply of nutrients resulting in macrosomia or growth restriction.
- ✓ Excretion of waste products like carbon di oxide, urea and uric acid.
- ✓ Transfer of passive immunity to the baby.
- ✓ Acts as an endocrine organ secreting human chorionic gonadotrophin, human placental lactogen, estrogens and

progesterone. The placental lactogen level is directly proportional to the size of the placenta.[11]

- ✓ Cloacking from the immune system of mother.
- ✓ Acts as a reservoir of blood for the fetus.

FIGURE 4: NORMAL PLACENTA

FIGURE 5: DOPPLER STUDY AT THE CORD INSERTION SITE

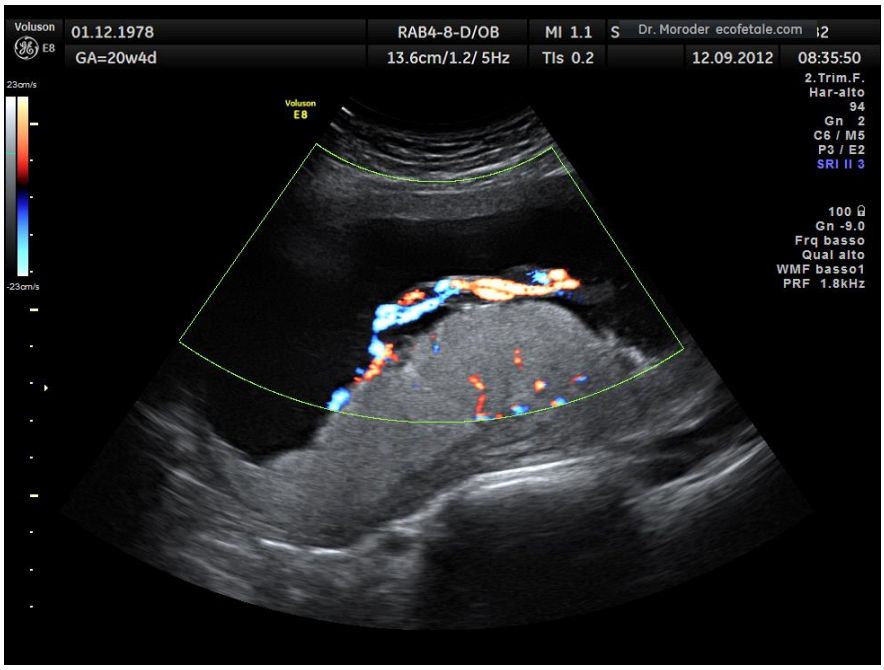


FIGURE 6: FALSE ENLARGEMENT OF PLACENTA DUE TO UTERINE CONTRACTION

The fetal surface of the placenta is represented by the echogenic chorionic plate, the maternal portion -basal plate lays at the junction of myometrium and the substance of placenta. The endometrial veins run behind the basal plate and more apparent when the placenta is located in the fundus or posteriorly within the uterine cavity.

Placenta is identified in sonography as early as eight weeks of pregnancy. Placenta assumes a relatively homogeneous pebble grey appearance between 8 & 20 weeks of pregnancy. The thickness of placenta corresponds to the gestational age in weeks. After 20weeks gestation the intraplacental sonolucencies (venous lakes) and placental calcification may begin to appear. A heterogeneous placenta is seen in patients with elevated maternal serum alpha fetoprotein or with history of first trimester bleeding[12].

The sonographer must maintain a perpendicular measurement of the placental surface in relation to the myometrial wall when evaluating the thickness of the placenta[13].

The following points are noted while imaging the placenta:

- Placental position – Anterior/posterior/Lateral/Fundal/Low lying
- Maturity of the placenta– grade 0/1/2/3

- Placental abruption
- Placental abnormalities –Adherent placenta, Placental anomalies, Placental infarcts.
- Placental tumors

Anterior placenta is one located anteriorly with minimal extension either in the fundus or laterally. Posterior placenta is one located posteriorly with minimal extension either in the fundus or laterally. Fundal placenta is one which is located in the fundus extending either anteriorly or posteriorly. Lateral placenta is in the lateral wall with equal extension to the anterior and posterior walls.

Sonographically thick placenta is seen in[14]

- ✓ Idiopathic.
- ✓ Maternal diabetes mellitus.
- ✓ Non immune and immune hydrops.
- ✓ Aneuploidy (trisomy).
- ✓ Fetal or maternal anemia.
- ✓ Fetal macrosomia.
- ✓ Beckwith-Wiedemann syndrome.
- ✓ CMV infection.
- ✓ Placental tumor.
- ✓ Placental abruption.

Small placenta seen in

- ✓ Hypertensive disorders of pregnancy.
- ✓ IUGR.
- ✓ Chromosomal anomalies.

Placental Grading: Grannum's scale[15]:

Grannum classified placental maturity into four grades, Grade 0 to Grade 3 based on ultrasound visualised changes in the chorionic plate, placental substance and basal layer.

FIGURE 7: GRADE 0 PLACENTA

Seen in late first trimester – early second trimester.

Uniform moderate echogenicity.

Smooth Chorionic plate without indentation

FIGURE 8: GRADE 1 PLACENTA

Mid second trimester – Early third trimester (18 to 29 weeks).

Subtle indentation of chorionic plate.

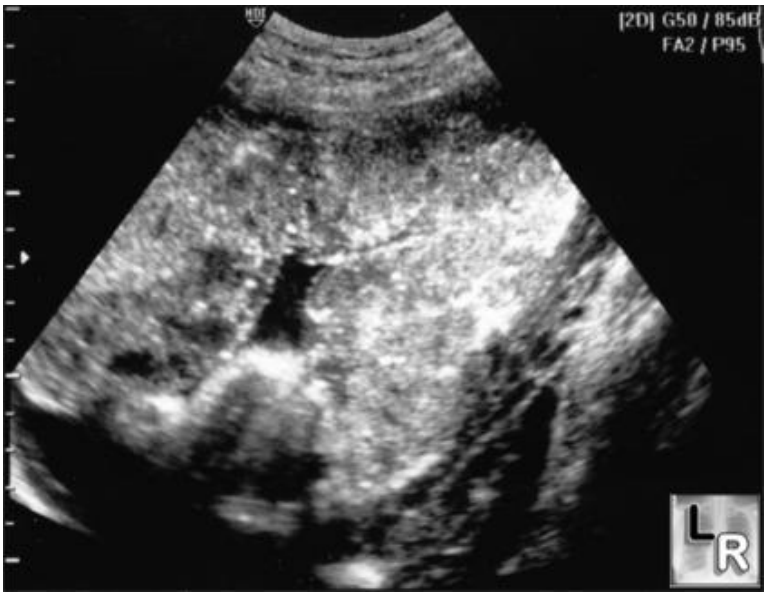
Small diffused calcification seen.

FIGURE 9: GRADE 2 PLACENTA

Late third trimester (> 30 weeks).

Chorionic plate shows marked indentations creating comma like densities which extend into the placental substance but do not reach the basal plate.

FIGURE 10: GRADE 3 PLACENTA



Seen >39 weeks to post dates. Complete indentation of chorionic plate through the basilar plate creating cotyledons. More irregular calcification with significant shadowing may signify placental dysmaturity.

The correlation between fetal pulmonary maturity and grade 3 placenta is very high in term pregnancies. But placental grading alone is not a good predictor of postmaturity as both grade 2 and grade 3 are seen in postmaurity.

BIOEFFECTS OF USG[16-20]

The impact of Ultrasonography on the practice of obstetrics has been profound. It was sir Ian Donald who first introduced the use of USG in obstetrics. Ultrasonography uses frequencies from 2-15 MHz .Ultrasonographic methods for the evaluating the fetus are now employed widely.

A carefully performed ultrasound examination reveals vital information about

- ✓ Fetal anatomy
- ✓ Fetal environment
- ✓ Fetal growth
- ✓ Fetal wellbeing

with no confirmed biological hazards.

Ultrasound technology has evolved from producing images of pregnancy to methods for measuring maternal and fetal circulatory function.

The acoustic condition of ultrasound used in humans are a frequency of 3-5MHz and an exposure time less than 30mins.Under this low

instrumental output conditions and shorter exposure period, no side effects are seen, hence ultrasound appears safe enough to be used.

According to American Institute of Ultrasound in Medicine(AIUM), there is no relationship demonstrated between diagnostic ultrasound and recognised adverse events in pregnancy. Given under the ALARA principle {as low as reasonably achievable} is that the minimum possible exposure of the ultrasound should be used to gain the necessary information.

For gestational age less than 10 weeks a thermal index for soft tissue is used and thermal index for bone is used for gestational ages 10 weeks or more. To document fetal heart rate M-mode imaging instead of spectral Doppler imaging should be used. As fetuses cannot contain gas bodies they are not at risk for effects related to rarefactional pressure.

Major biological effects of ultrasound are believed to be thermal and cavitation. One can minimize the thermal effects by not staying in one spot especially over fetal bone for long period of time. Cavitation is dependant on presence of gas pre-existing within the tissue.

Under experimental conditions with high intensity and continuous exposure the following bio effects may be seen,

- ✓ macro nodular degeneration invitro.
- ✓ Cellular effects such as cell membrane changes increased protein and DNA synthesis.
- ✓ genetic damage (mutations).
- ✓ Sister chromatid exchange (SCE) probably due to DNA repair after cell damage.

AIUM says that,

No adverse effects on patients or operators caused by exposure at regular intensities of present diagnostic instruments have been reported. The current data states that the advantages of diagnostic ultrasound outweigh the risk.

ADVANTAGES OF USG:

1. USG waves are non ionizing.
2. It is not associated with carcinogenesis.
3. Easy, less expensive, non invasive, painless and portable.

4. Its real time nature can be applied to study physiology. Eg-Fetal heart rate.

5. Doppler evaluation is possible.

DISADVANTAGES OF USG:

1. Operator dependant.

2. Not used for bone or air.

USES OF AN ULTRASOUND:

Ultrasound in an antenatal woman has become one of the important investigations that is routinely done now a days. There are specific periods during a normal pregnancy when ultrasound will be most useful and provide the maximum information.

These are:

1. Dating scan before 9 weeks.

2. Late first trimester scan 11- 13+6 weeks.

3. Target scan at 18 – 22 weeks.

4. Growth scan at 28 – 34 weeks.

Information in a dating scan are:

1. To confirm intrauterine pregnancy and cardiac activity.

2. To estimate gestational age.

3. To rule out ectopic pregnancy and vesicular mole.

4. To diagnose and evaluate multiple pregnancy.

5. To evaluate uterus and adnexa.

Information in a late first trimester scan are:

1 Nuchal translucency.

2 Aneuploidy screening.

Information in target scan:

1. To diagnose fetal anomalies.

2. To locate placenta.

3. To recognize myomas or other associated pelvic mass that may interfere with pregnancy or delivery.

Information in growth scan:

1. To know the interval growth.
2. Recognize intrauterine growth restriction.
3. Fetal anomaly missed at first scan.

4. Confirm presentation and position of fetus.
5. Locate placenta accurately.
6. Assess the amount of amniotic fluid.

So along with this the placental thickness can be measured and maturity of fetus can be assessed.

Role of Ultrasound in Gestational age Estimation:

It is recognized that assessment of dates from LMP is biased in 20% to 40% of the mothers. Some reasons for this uncertainty are irregular cycle and other menstrual irregularities, ovulation and implantation bleeding, pregnancy following contraceptives and menstrual dates fall within wide margin of about 3weeks in 90% of population.

The pelvic examination is also unreliable for accurate dating. Errors in the estimation confirming fetal maturity have contributed to the development of Respiratory distress syndrome with resultant perinatal morbidity and mortality.

Apart from the iatrogenic prematurity, objective knowledge of the data is essential in the management of all pregnancy in particular with regard to the method of MTP, management of high risk pregnancy, elective or planned induction of labour, elective LSCS.

First Trimester Dating:

Gestational sac measurement:

From 5th to 11th week of pregnancy, mean diameter and the volume of gestational sac is measured. The sac is first visualized in uterus in the 5th menstrual week and its diameter increases at the rate of 7 to 11 mm/week to reach 5 – 6cm by 10th week.

G.sac volume = 0.55 x 33 x D1 x D2 x D3

Mean sac diameter (mm) + 30 = gestational age in days

Where D1, D2, D3 are the transverse, anteroposterior and longitudinal diameters of the sac. This measurement has been superseded by measurement of Crown Rump Length.

Crown Rump Length:

This is a very important technique in first trimester. It is superior to MSD measurement. Rule of thumb is adding 6.5 to CRL measured in cms. After 8weeks, it is very valuable predictive measurement, but it's not much of value before 8 or after 12 weeks.

Biparietal Diameter:

BPD has got good accuracy in predicting gestational age from 14 – 20 weeks.The most commonly accepted plane is the transthalamic view which includes the falx, the thalamus and most important, the cavum septum pellucidum. The transducer must be perpendicular to the central axis of the head and thus the hemisphere and calvaria should appear symmetric. Cerebellar hemispheres are to be avoided. Calipers are placed from:

Outer edge of the near calvarial wall to

Inner edge of the far calvarial wall.

In the second trimester predictive accuracy is within 7-10 days. After 31weeks the predictive accuracy decreases and to an extent of 15 days at 95% confidence range. Hence BPD measurement at any duration of pregnancy is at least as good as the most reliable menstrual dates.

Growth of BPD per week:

13 – 20wks - 3-4mm
21-28wks- 3mm
29-32wks- 2.3mm
32-term- 2mm.

BPD is invalid in cases of

- ✓ IUGR
- ✓ Polyhydramnios
- ✓ Occipitoposterior presentation
- ✓ Deeply engaged head
- ✓ Breech presentation
- ✓ Hydrocephalus
- ✓ Microcephaly

Mitra and Kumar et al[21] (1999) stated that BPD is not reliable in PROM cases. BPD seems relatively unreliable after 30weeks, hence pregnancy dating has to be done utilising other parameters like HC, AC and FL in addition to BPD . This is termed as GA by multiple growth parameters.

Head Circumference:

HC= (BPD + occipitofrontal diameter)^3 x 1.62

HC is measured in the same plane as BPD around the outer perimeter of the calvarium. Measurement of HC is not affected by shape of the head.

It may be true that HC is more predictable than BPD near term, but it is less accurate prior to 26 weeks.

Abdominal circumference:

It is not a good predictor of fetal age when compared to BPD except during 36-42weeeks at which time it is more accurate than BPD. Used as a tool to assess fetal growth.

Abdominal circumference is measured in symmetrical transverse round section at the skin line with vertebra visualised and in a plane where stomach, umbilical vein and portal sinus are visualised.

Femur Length:

Shaft of femur is the easiest long born to visualize and measure. It is obtained from greater trochanter to lateral condyle. Head of femur is not included. Measurement of femur length is reliable after 14 weeks of gestation. The femoral shaft is measured with the beam of insonation being perpendicular to the shaft excluding the distal femoral epiphysis.

Average FL at term 7.4-7.7cm.

One of the most recent additions to the already existing parameter are size of fetal foot, measurement of transcerebellar diameter, renal length and placental thickness.

Fetal Kidney:

After 17weeks, fetal kidneys are 90% imaged. After 2weeks, due to increased hyperechoic perinephric fat fetal kidneys become easily identified. The rule of thumb is menstrual age in weeks approximate kidney length in mm or twice the AP diameter in mm.

Transverse cerebellar diameter:

It is measured as the maximal diameter between both cerebellar hemisphere on an axial scan. TCD in mm roughly coincides with the GA in weeks from 14-20 weeks. **Chavez et al (2004)** reported that its use can be extended to third trimester[22].

Placental Thickness:

Placental thickness is usually determined subjectively. It is best obtained in mid position perpendicular to the placental surface from the chorionic plate to the beginning of basilar myometrial layer. The measurement can be taken at a position where the umbilical cord inserts into the placenta excluding the uterine myometrium and retroplacental veins. The thickness is considered normal throughout the 2nd and 3rd trimester if between 2 and 4 cm. Care must be taken not to measure either obliquely or near uterine contraction because the placental sizes can be altered, usually creating a false impression of enlargement.

RELATED ARTICLES:

PLACENTAL THICKNESS AND GESTATIONAL AGE:

1. **W.K.Hoddick et al[23] (1985)** reviewed sonograms of 200 singleton pregnancies. Placental thickness was measured and correlated with menstrual age. Placental thickness increased with advancing menstrual age. **At no stage of pregnancy was the normal placenta greater than 4cm in thickness.**

2. **Ghosh UK et al[24] (1990)** analyzed 120 uncomplicated pregnancies of 32 to 40weeks of gestation. Placental diameter and thickness were measured. Placental diameter increased with advancing pregnancy where as placental thickness decreased with increasing gestational age. In75% of cases **a single ultrasound measurement of placental thickness can predict gestational age within ± 14days in the last 8weeks of pregnancy.**

3. **Anupama jain et al[25] (2001)** analyzed 500 normal antenatal cases of more than 10weeks gestation. Mean values of placental thickness was calculated for different gestational ages. It was observed that the mean placental thickness increased from 15mm at 10weeks to 36mm at 39weeks of gestation. **Placental thickness matched almost equally from 27weeks to 33weeks of gestation.**

4. **P.Mittal et al[26] (2002)** analyzed 600 antenatal cases of all gestational ages (more than 10wks of gestation). Patients with PIH, IUGR, DM, Hydrops Fetalis, congenital malformation, twins were excluded from this study. After estimating the fetal age by CRL, BPD, FL, HC, AC, Placental Thickness was measured in each case. It was observed that the placental thickness gradually increased from 15mm at 11wks of gestational age to 37.5mm at 39wks.**From the 22nd week to 35th week of gestation the placental thickness coincide almost exactly with the gestational age in weeks.**

5. **Muhamed haneef et al[27] (2005)** studied 100 cases of gestational age of more than 12weeks. Placental thickness increased from 16mm at 12weeks to 39mm at 40weeks.

6. **Tiwari et al[28] (2013)** measured placental thickness on 754 antenatal women. In their study placental thickness at 11 weeks was 15mm and 36.3mm at 39 weeks. **Placental thickness exactly matched the gestational age from 22 to 35 weeks.**

PLACENTAL THICKNESS WITH GESTATIONAL AGE AND FETAL BIOMETRY:

7. **Ohagwu C C et al[29] (2009)** 666 pregnant Nigerian women and established nomograms of placental thickness. They proved a significant correlation between placental thickness and gestational age and BPD and AC.
8. **Karthikeyan et al[30] (2012)**studied about 211 normal antenatal mothers from 11 to 40 weeks. They calculated correlation between placental thickness and gestational age separately for each trimester. Placental thickness had a positive correlation with placental thickness in all three trimesters. They also concluded that placental thickness positively correlated with other fetal parameters like BPD, FL, HC and AC.
9. **Arafa Ahmed et al[31] (2014)**included 110 pregnant women in third trimester. Study was done in Sudan from 2009-2010. There was a significant positive correlation of placental thickness with FL and BPD.

PLACENTAL THICKNESS WITH BIRTH WEIGHT AND IUGR:

10. **Habib FA et al[32] (2002)** studied placental diameter and thickness by ultrasound at 36weeks of gestation in 70 singleton pregnancies **a warning limit of placental diameter of 18cms and placental thickness of 2cm at 36weeks of gestation were calculated to predict the low birth weight in infants.** Ultrasonographic placental thickness appears to be of prognostic value in identifying the subsequent occurrence of IUGR.

11. **Betty M Mathai et al[33] (2013)** apart from correlating placental thickness to gestational age, they divided the study population -498 antenatal women into two groups based on outcome fetal weight .Group A includes fetal weight < 2500g and Group B includes fetal weight > 2500g. Placental thickness was calculated from gestational weeks 24 to 39. The 'r' value indicating correlation between placental thickness and gestational age for group A is 0.325 and group B is 0.135. `p' value is 0.01. The placental thickness mean values for Group A and Group B are different. It is higher for Group A when compared to Group B.

12. **Afrakhteh et al[34] (2013)** enrolled 250 antenatal women and was able to successfully do study in 205 women. Relationship between

placental thickness and weight of the placenta and fetal weight. They found a significant correlation with both second and third trimester placental thickness and birth weight. But then change in placental thickness could not predict low birth weight.

13. **Nagamani et al[35] (2015)** they did a study of ultrasound characters of placenta and fetal outcome. In about 500 antenatal women they measured placental thickness, diameter and placental grading . Perinatal outcome was measured with APGAR score, birth weight and weight of the placenta. The study proved significant correlation between birth weight and placental thickness. `p' value <0.001.

PLACENTAL THICKNESS AND LOCATION:

14. **Durnwald et al[36] (2004)** analyzed 167 singleton viable pregnancies. Women with suspected abruption, placenta previa, fibroid, uterine and fetal anomalies, abnormal fluid volume were excluded. Placental thickness was measured at mid point of placental mass. Placental thickness was measured at the fundal, anterior, posterior implantation sites. The purpose of the study was to identify differences in sonographic placental thickness with advancing gestation and based on implantation site. It was observed that there was **step wise increase in placental thickness with increasing**

gestation (15.8mm, 27.1mm, 37.6mm for 1st, 2nd, 3rd trimester respectively). **In the third trimester the placental thickness of posterior and fundal placenta was significantly greater than anterior placenta. Parity and BMI doesn't affect placental thickness.**

15. **Lee et al[37] (2012)**conducted a pilot study including 114 antenatal women in their second trimester {18-22 weeks}. They concluded that **anterior placenta seems to be thinner than posterior placenta by approximately 7mm. Posterior placenta more than 40mm and anterior placenta more than 33mm could be abnormally thick.**

PLACENTAL THICKNESS AND PERINATAL MORTALTY:

16. **Dombrowski et al[14] (1992)** stated that sonographically thick placenta are associated with increased perinatal morbidity and mortality, the majority being nonimmune hydrops, placental abruption, congenital anomalies and premature rupture of membranes, SLE- heart block, Intrauterine growth restriction, supraventricular tachycardia and Hepatoblastoma.

17. **Elchalal U et al[38] (2000)** analyzed 561 normal singleton pregnancies to establish the correlation of sonographically thick placenta with perinatal mortality and morbidity. Thick placenta was determined as placenta that was above the 90th percentile. A linear increase of placental thickness was found to correlate with gestational age throughout pregnancy. **Sonographically thick placenta is associated with increased perinatal risk with increased mortality related to fetal anomalies and higher rates of both SGA and LGA infants at term.**

PLACENTAL THICKNESS AND CHROMOSOMAL ANOMALIES:

18. **Ghosh A et al[39] (1994)** measured placental thickness by ultrasound at 10 to 21weeks of gestation in 231pregnancies at risk for homozygous Alpha thalassemia. The sensitivity in detecting the affected pregnancies after 12weeks was 0.95 and by 18weeks it reached 1.0 .**Thus the selection of pregnancies at risk by measurement of placental thickness will reduce the number of invasive diagnostic procedures.**

19. **Stoll et al[40] (1998)** examined the placentae of 400 Down's syndrome babies and found that the placentae of Down's syndrome babies at term was smaller than the placentae of normal pregnancies.

20. **Tongsong T et al[41] (1999)** evaluated the efficacy of placental thickness at mid pregnancy in predicting fetal Hb Bart's disease in pregnancy at risk. Placental thickness of more than 13mm was considered abnormal for 18 to 21weeks of gestation. Mean placental thickness for normal pregnancy and pregnancies with Hb Bart's fetuses were significantly different. **For couple at risk, if placental thickness is normal then the risk of having Hb Bart's fetus is markedly decreased**.

21. **Tongsong T et al[42] (2004)** established a nomogram for placental thickness for each week of gestational age ranged from 9 to 37weeks. By regression analysis, placental thickness (in mm) = gestational age in weeks x 1.4 – 5.6 (r = 0.82).This nomogram may be a useful aid in the early detection of placental abnormalities like hydropsfetalis. (Hb Bart's disease)

PLACENTAL VOLUME:

22. **Bleker et al[43] (1977)** have shown that human placenta grows with the fetus. They measured placental volume. The placenta possibly attains maximum volume before term and thereafter it stops growing.

23. **Kwok Yin Leung et al[44](2001)** proved that there is a correlation between placental volume and gestational age and CRL.

24. **Metzenbauer et al[45] (2001)**did a correlative study between placental volume and first trimester screening parameters like PAPP-A and serum ßhCG. There was a strong positive correlation and suggested that this placental volume measurement may change first trimester screening methodology.

25. **Hafner et al[46] (2001)**correlated high resistance Doppler in the second trimester with first trimester placental volume. He concluded that abnormal Doppler at 22- 24 weeks is related to small volume placentae in first trimester.

26. **de Paula et al[47] (2008)**measured placental volumes in 295 normal singleton pregnancies and constructed nomograms with reference to gestational age and estimated fetal weight.

In addition to these

- ✓ Ventricular size
- ✓ Length of Humerus
- ✓ Fetal Clavicle Length,
- ✓ Foot length
- ✓ Biocular distance
- ✓ Interocular distance

are also used as predictors of gestational Age.

MATERIALS AND METHODS

Our study Ultrasonographic placental thickness - its correlation to gestational age was done with the help of department of Radiology at ESIC-PGIMSR Chennai. It is an observational study. About 333 antenatal mothers of different gestational ages attending the OPD were studied for their placental thickness. Each patient was scanned once during the study.

Inclusion criteria:

- ✓ Antenatal mothers of gestational age (11-40weeks) attending OPD.
- ✓ Antenatal mothers with LMP known.
- ✓ Singleton pregnancy**.**

Exclusion Criteria:

- ✓ Consent not given.
- ✓ Irregular periods.
- ✓ LMP not known.
- ✓ Polyhydramnios.
- ✓ Diabetes mellitus.
- ✓ Hypertensive disorders of pregnancy.
- ✓ Heart disease complicating pregnancy.
- ✓ Anemia complicating pregnancy.
- ✓ Jaundice complicating pregnancy.

- ✓ Renal disease.
- ✓ Diagnosed Intrauterine growth restriction.
- ✓ Hydrops fetalis.
- ✓ Multiple pregnancy.
- ✓ Fetal anomalies.
- ✓ Placental anomalies.

Examination methods:

* Consent for doing ultrasound and their co-operation for my study was taken.
* A thorough history regarding medical illness & obstetric history is taken for each patient.
* Symphysio – fundal height was measured after emptying the bladder. Fundal height by palpation and gestational age was clinically assessed.

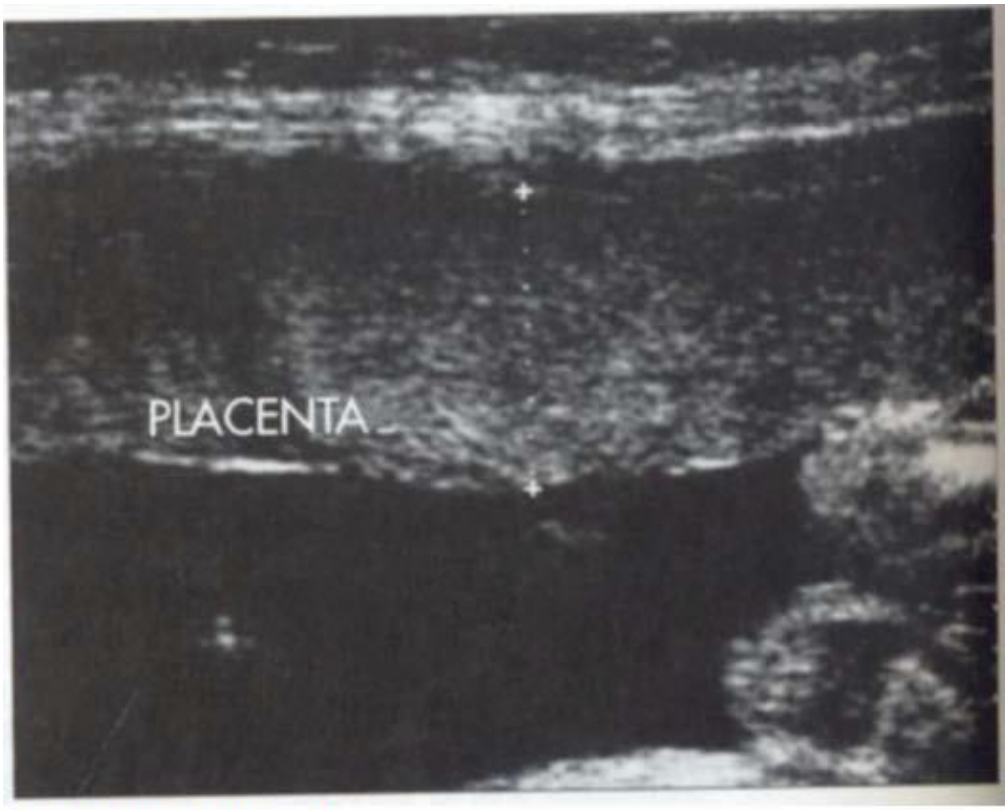
These antenatal mothers with known LMP, Inclusion criteria satisfied & exclusion criteria verified are subjected to ultrasonographic examination. After estimating the fetal age by CRL, BPD, HC, AC and FL, placental thickness is measured for mothers whose fetal biometry corresponds to LMP and the clinically assessed gestational age.

Ultrasonographic examination is performed in the department of Radiology. Transabdominal sonographic examination was performed using a 3.5 MHz convex probe. This scan is performed with optimal bladder with the mother in the supine position.

FIGURE 11: CORD INSERTING INTO PLACENTA

The umbilical cord inserting into the placenta is clearly seen in this picture.

FIGURE 12: CALIPER PLACEMENT FOR PLACENTAL THICKNESS



Thickness of placenta
(Calipers must be placed perpendicular to the placental borders)

While measuring the thickness of placenta, the callipers should be perpendicularly placed. If there is uterine contraction it may falsely increase the placental thickness hence it is prudent not to measure during a uterine contraction.

FIGURE 13: MACHINE USED FOR STUDY

Logic 200 pro series 2D ultra sound and 3.5MHz convex transducer.

The ultrasound gestation age is calculated by measuring CRL (11-13 weeks), BPD, AC, FL, HC (14-40Weeks). Placental thickness is measured in millimetres at the level of umbilical cord insertion in its longitudinal direction and the mean of 3 readings will be taken.

STATISTICAL TOOLS:

The information collected regarding all the selected cases were recorded in a Master Chart in Excel sheet. Data analysis was done with the help of computer using SPSS statistical package- Version 17.

Using this software range, frequencies, percentages, means, standard deviations, ‘F’ value and ‘p’ values were calculated. For qualitative variables chi square test was used. A 'p' value less than 0.05 will denote significant relationship. Regression analysis was done for estimation of gestational age with the help of other variables.

For preparing the diagrammatic representations, Power point software was used.

RESULTS AND ANALYSIS:

In our study a total of 333 antenatal mothers were studied. Along with routine fetal biometry like CRL, BPD, HC, AC and FL, placental thickness was also measured for these antenatal mothers. The results were analysed with the regard to the gestational age, placental thickness, location of placenta and fetal biometry like BPD,FL, HC and AC.

The mean value of placental thickness along with the respective standard deviation was calculated for gestational age from 11-40 weeks.

The correlation between placental thickness and gestational age was analysed using Pearson's correlation. Correlation between placental thickness and other fetal parameters like BPD, FL, HC and AC was analysed using Pearson's correlation.

Association between Placental Thickness and Placental location in each trimester calculated using Student's 't' test.

Association between Placental Thickness with Gestational age and fetal biometry parameters calculated using Student's 't' test

Table 2: Age distribution

Age distribution	Cases	
	No	**%**
Below 20 yrs	8	2.4
20 – 24 yrs	101	30.3
25 – 29 yrs	136	40.8
30 – 34 yrs	74	22.2
35 yrs & above	14	4.2
Total	333	100.0

There were total of 333 antenatal women. Age distribution ranged from 18years to 40 years. There were 8 cases below 20 years, 101 cases between 20 -24 years, 136 cases between 25-29 years, 74 cases between 30-34 years, 14 cases above 35 years.

FIGURE 14: AGE DISTRIBUTION

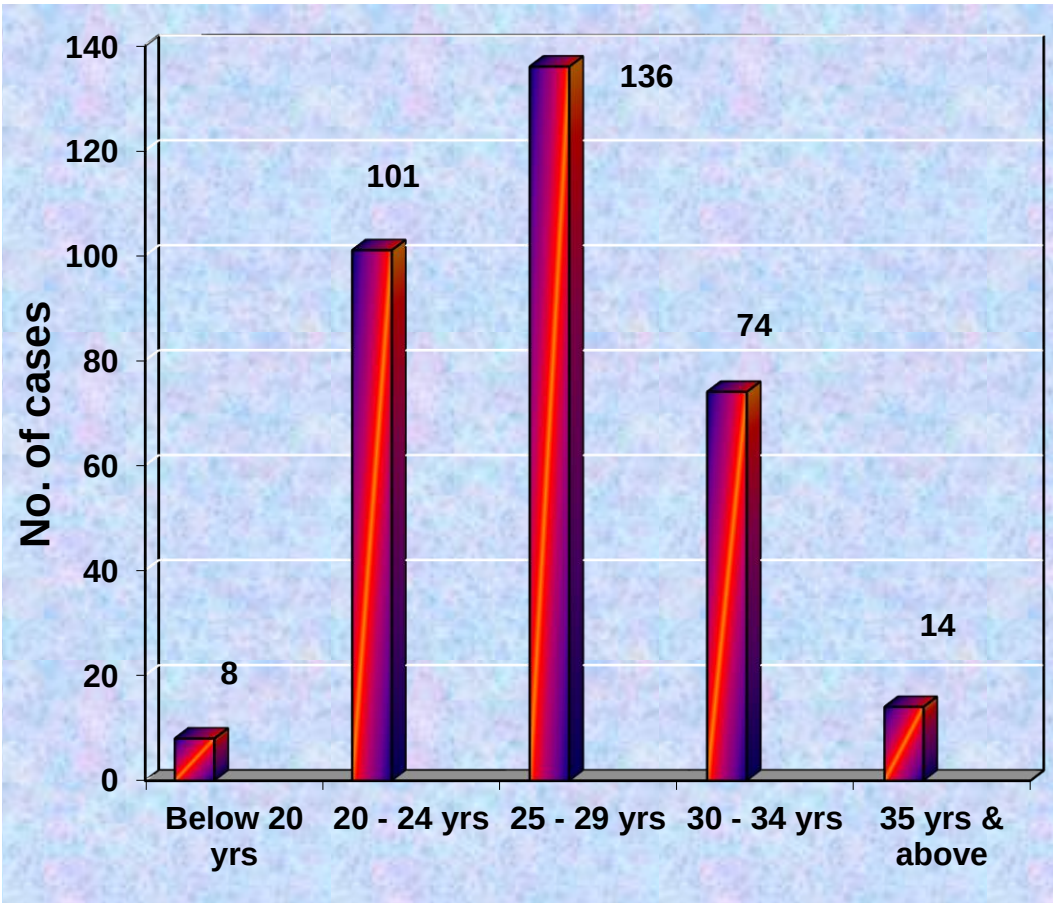


Table 3: Parity

Parity	Cases	
	No	**%**
Primi	149	44.7
Multi	184	55.3
Total	333	100.0

Among the total 333 antenatal women 149 were primi and 184 were multi as evident from the table.

FIGURE 15: PARITY

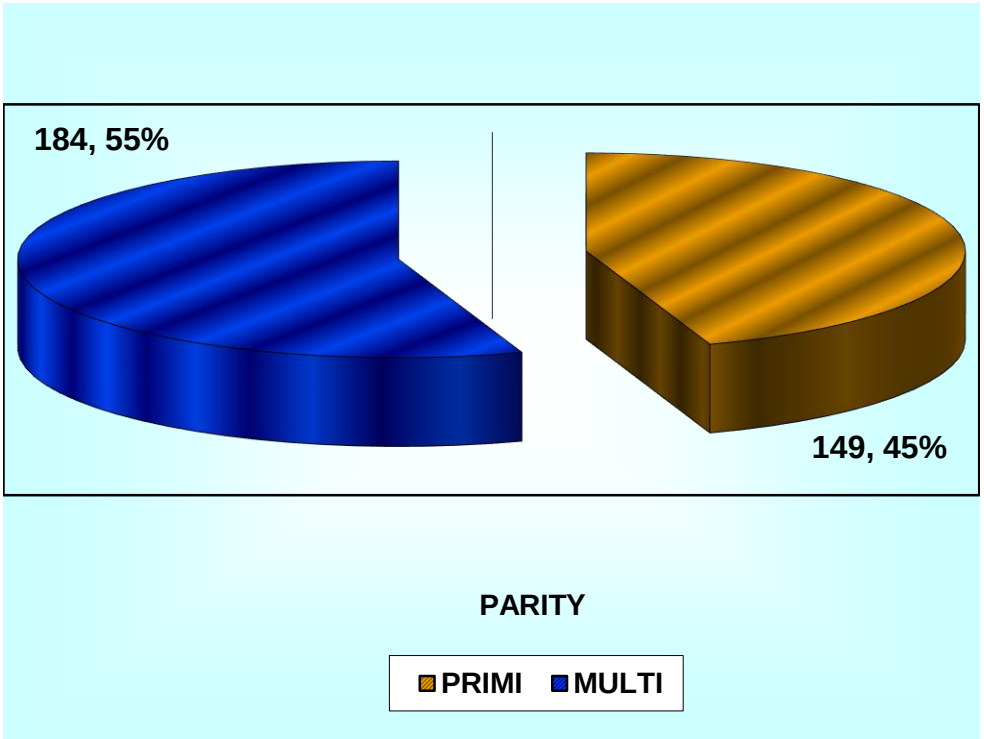


TABLE 4 : GESTATIONAL AGE

Gestational Age	Cases	
	No	**%**
Up to 13 weeks + 6 days	15	4.5
14 weeks – 27 weeks + 6 days	145	43.5
28 weeks & above	173	52.0
Total	333	100.0

About 333 antenatal women with varying gestational ages from 11-40 weeks were included in the study. There were 15 women in the first trimester, 145 women in second trimester and 173 women in third trimester.

FIGURE 16: GESTATIONAL AGE

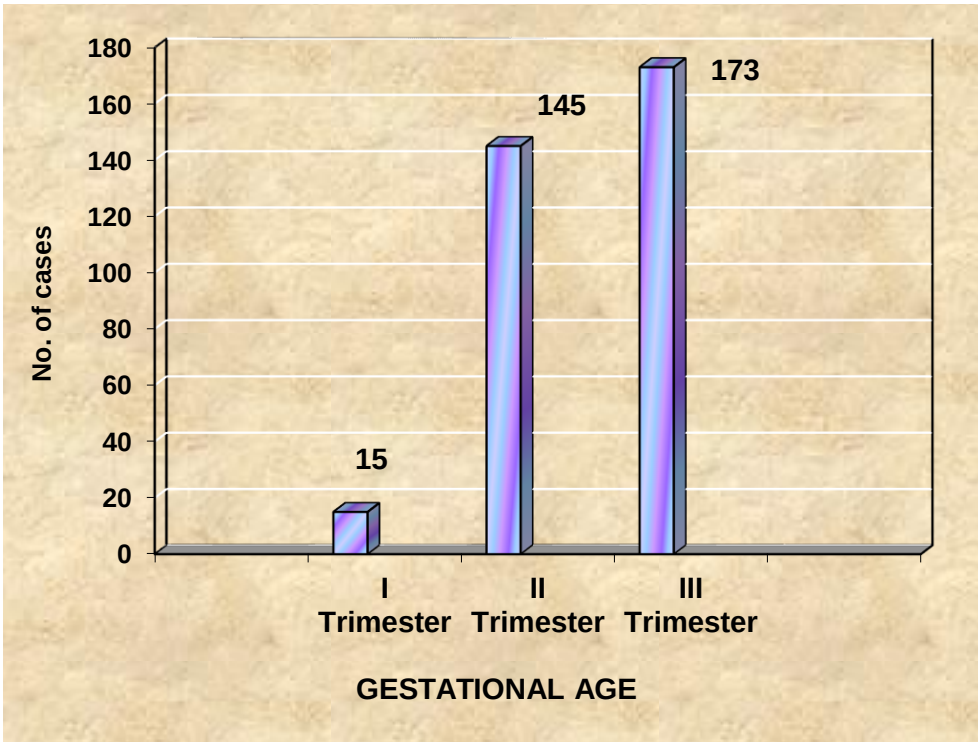


Table 5 : Placental Location

Placental Location	Cases	
	No.	**%**
Anterior	155	46.5
Posterior	155	46.5
Lateral	12	3.6
Fundal	11	3.3
Total	**333**	**100.0**

FIGURE 17: PLACENTAL LOCATION

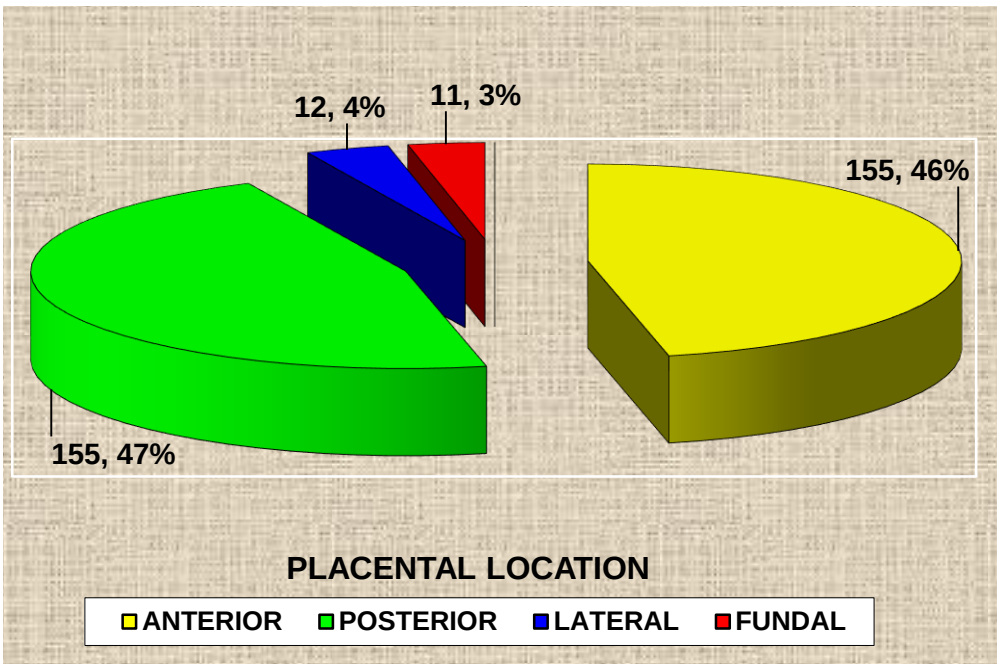


Table 6 : Placental Location and Thickness in each trimester

Placental Location	I Trimester			II Trimester			III Trimester		
	No. of cases	**Mean**	**S.D.**	**No. of cases**	**Mean**	**S.D.**	**No. of cases**	**Mean**	**S.D.**
Anterior	9	14.86	0.75	67	22.83	2.67	79	32.97	3.07
Posterior	4	14.5	0.32	70	22.71	2.95	81	33.19	2.63
Lateral	1	15.2	-	1	24.3	-	10	33.71	3.86
Fundal	1	16.0	-	7	22.77	3.96	3	31.67	0.25
Total	15	14.86	0.69	145	22.78	2.85	173	33.09	2.89
'p'	0.2707 Not significant			0.9508 Not significant			0.7035 Not significant		

Association between Placental Thickness and Placental location was calculated using Student's `t'test.

Placental location in each trimester was correlated with placental thickness for each trimester and found that the placental location does not affect the placental thickness. 'p' value in first trimester is 0.2707, 'p' value for second trimester is 0.9508 and 'p' value for third trimester is 0.7035.Not significant.

FIGURE 18: PLACENTAL LOCATION& PLACENTAL THICKNESS

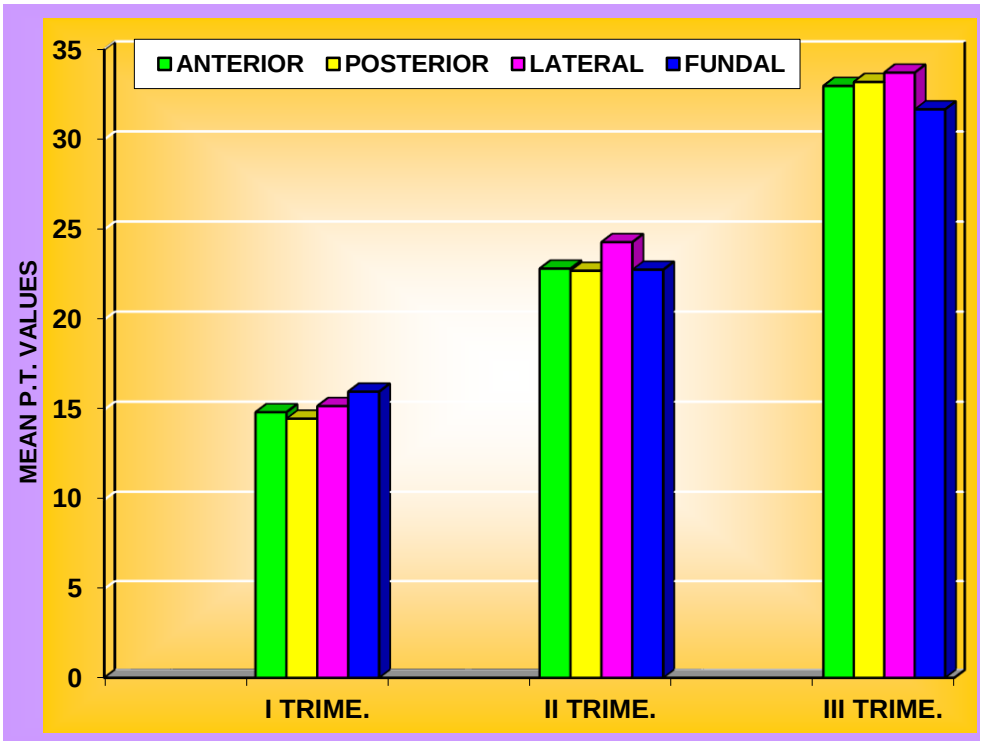


TABLE 7 : BIRTH WEIGHT (KG)

Birth Weight (Kg)	Cases	
	No.	%
<2	0	0.00%
2 to 2.49	7	2.22%
2.5 to 2.99	148	46.98%
3 to 3.49	143	45.40%
>3.5	17	5.40%
Total	**315**	**100.00%**

FIGURE 19: BIRTH WEIGHT DISTRIBUTION

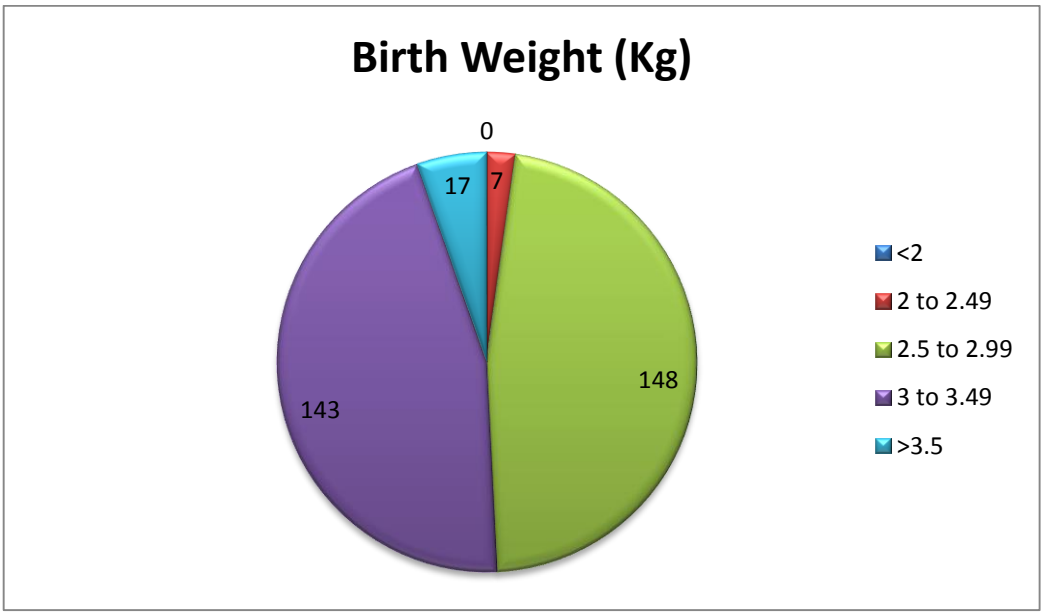
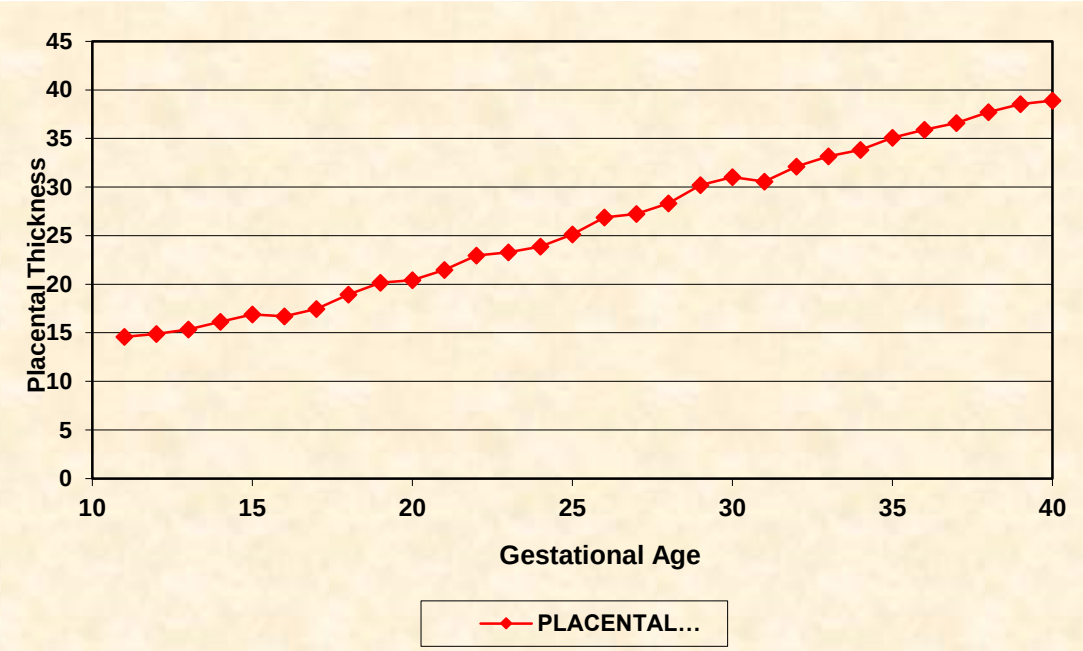


TABLE 8:PLACENTAL THICKNESS VS GESTATIONAL AGE

Sl.No.	Gestational Age (weeks)	No. of cases	Placental Thickness (mm)	
			Mean	S.D.
1	11	6	14.6	0.34
2	12	6	14.9	0.93
3	13	3	15.3	0.61
4	14	3	16.1	0.45
5	15	2	16.9	0.57
6	16	1	16.7	0.0
7	17	2	17.5	1.06
8	18	4	19.0	0.5
9	19	5	20.2	0.6
10	20	18	20.4	0.88
11	21	23	21.5	0.66
12	22	23	22.9	1.1
13	23	19	23.3	1.41
14	24	10	23.9	0.85
15	25	13	25.1	0.95
16	26	9	26.9	1.02
17	27	13	27.3	1.38
18	28	14	28.3	0.97
19	29	14	30.2	0.75
20	30	15	31.0	1.21
21	31	16	30.6	0.98
22	32	24	32.1	0.65
23	33	16	33.2	0.74
24	34	15	33.8	0.92
25	35	23	35.1	0.83
26	36	12	35.9	0.51
27	37	8	36.6	0.59
28	38	9	37.7	0.4
29	39	4	38.5	0.31
30	40	3	38.9	0.2

FIGURE 20: PLACENTAL THICKNESS Vs GESTATIONAL AGE



Placental thickness had a linear relationship with gestational age. As gestational age increases placental thickness also increases.

Mean placental thickness for gestational ages 11 to 40 weeks calculated and it is evident that placental thickness increases as gestational age increases[9].

FIGURE 21: PLACENTAL THICKNESS Vs GESTATIONAL AGE

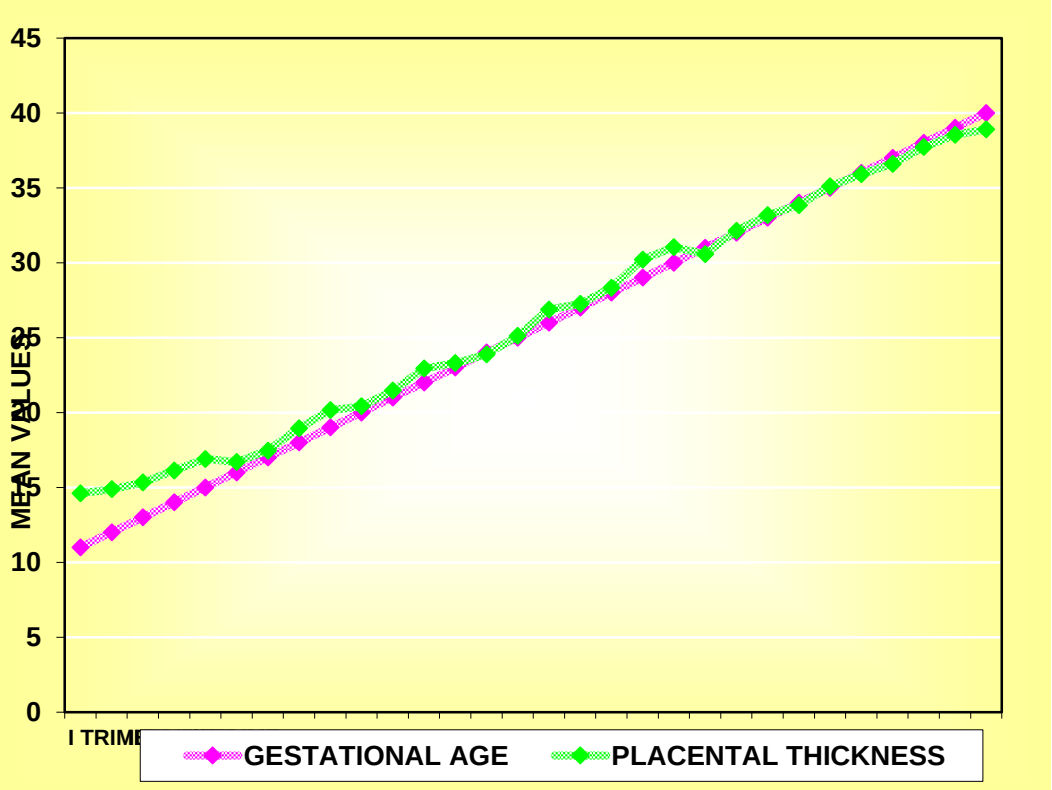


Fig 21 shows that placental thickness almost matched gestational age from 20 to 36 weeks.

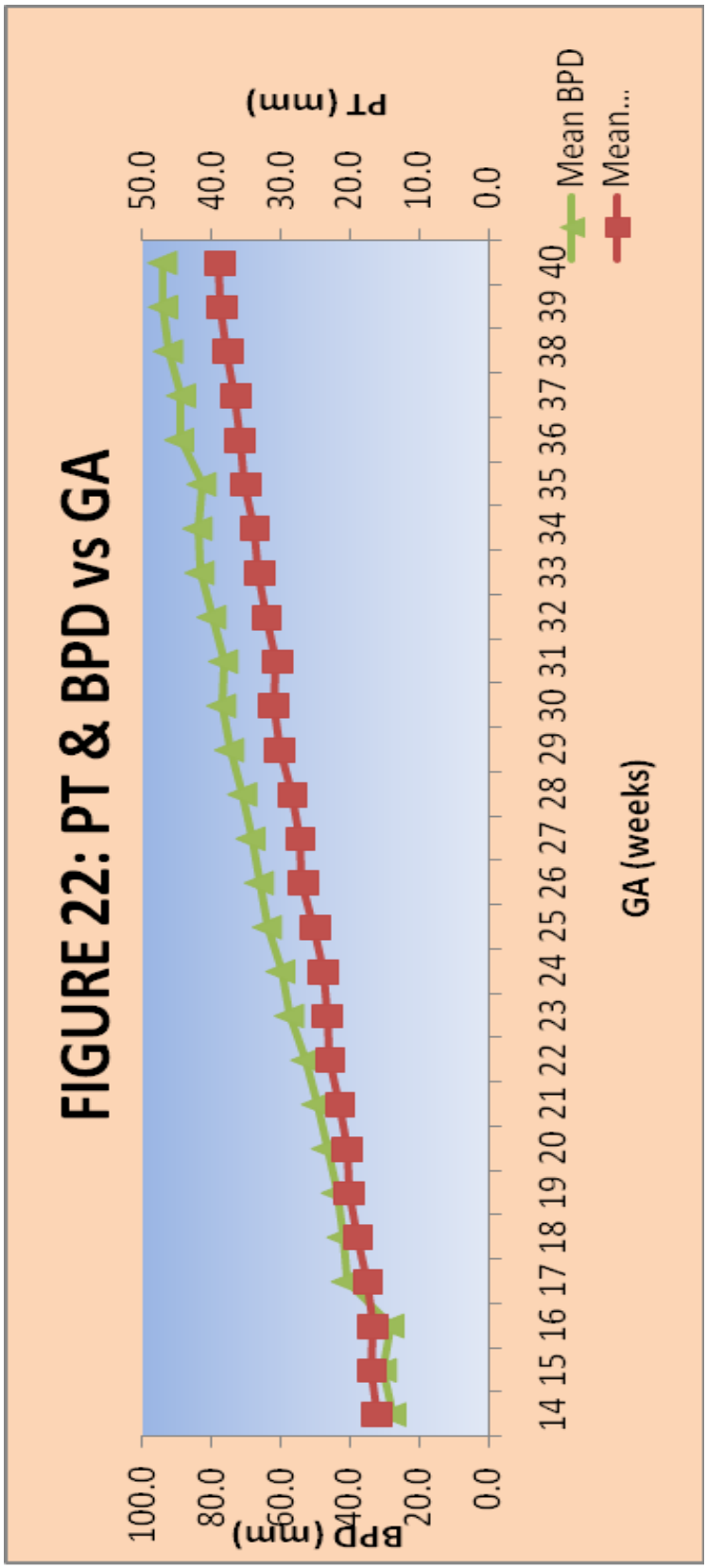


FIGURE 22: PT & BPD vs GA
BPD (mm)
PT (mm)
GA (weeks)
Mean BPD
Mean...
0.0
20.0
40.0
60.0
80.0
100.0
0.0
10.0
20.0
30.0
40.0
50.0
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

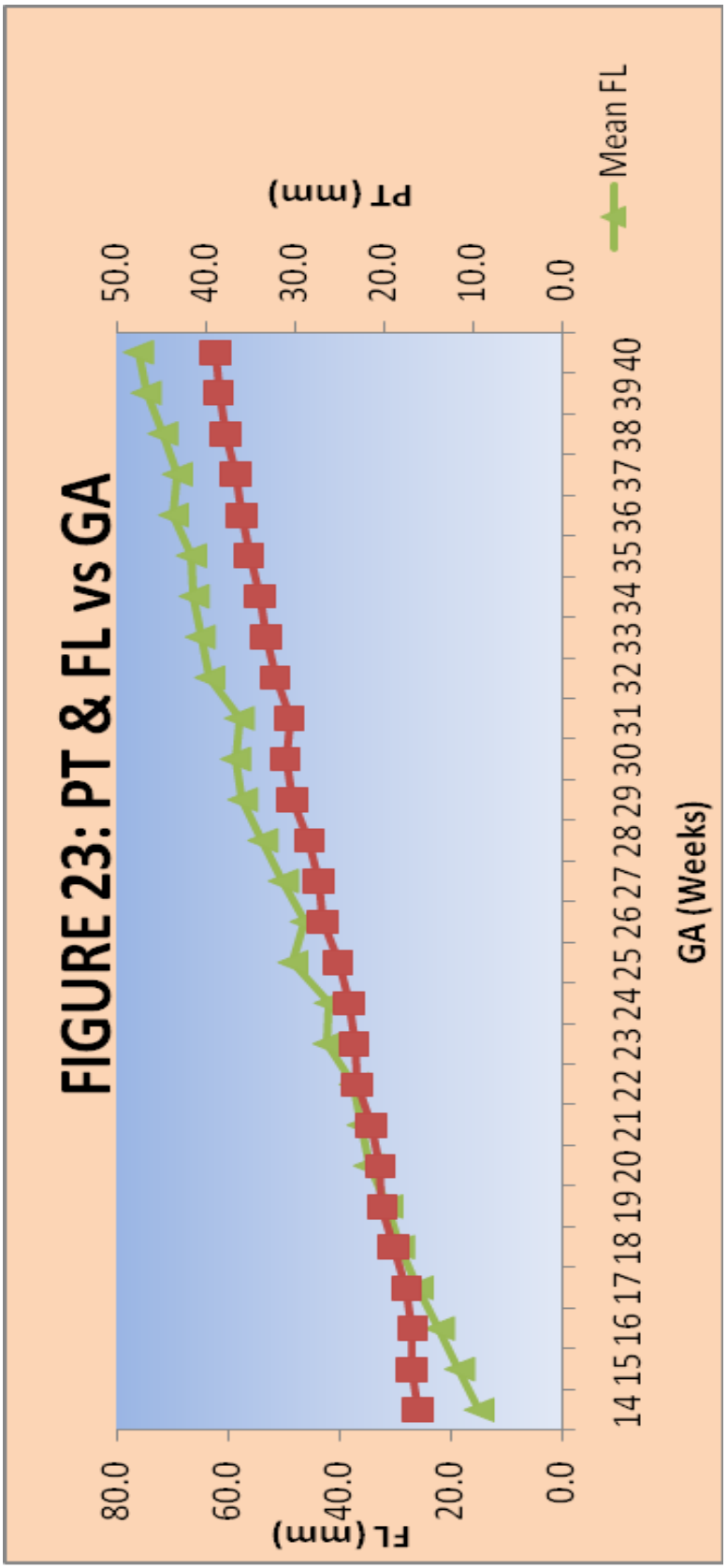


FIGURE 23: PT & FL vs GA
FL (mm)
80.0
60.0
40.0
20.0
0.0
PT (mm)
50.0
40.0
30.0
20.0
10.0
0.0
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
GA (Weeks)
Mean FL

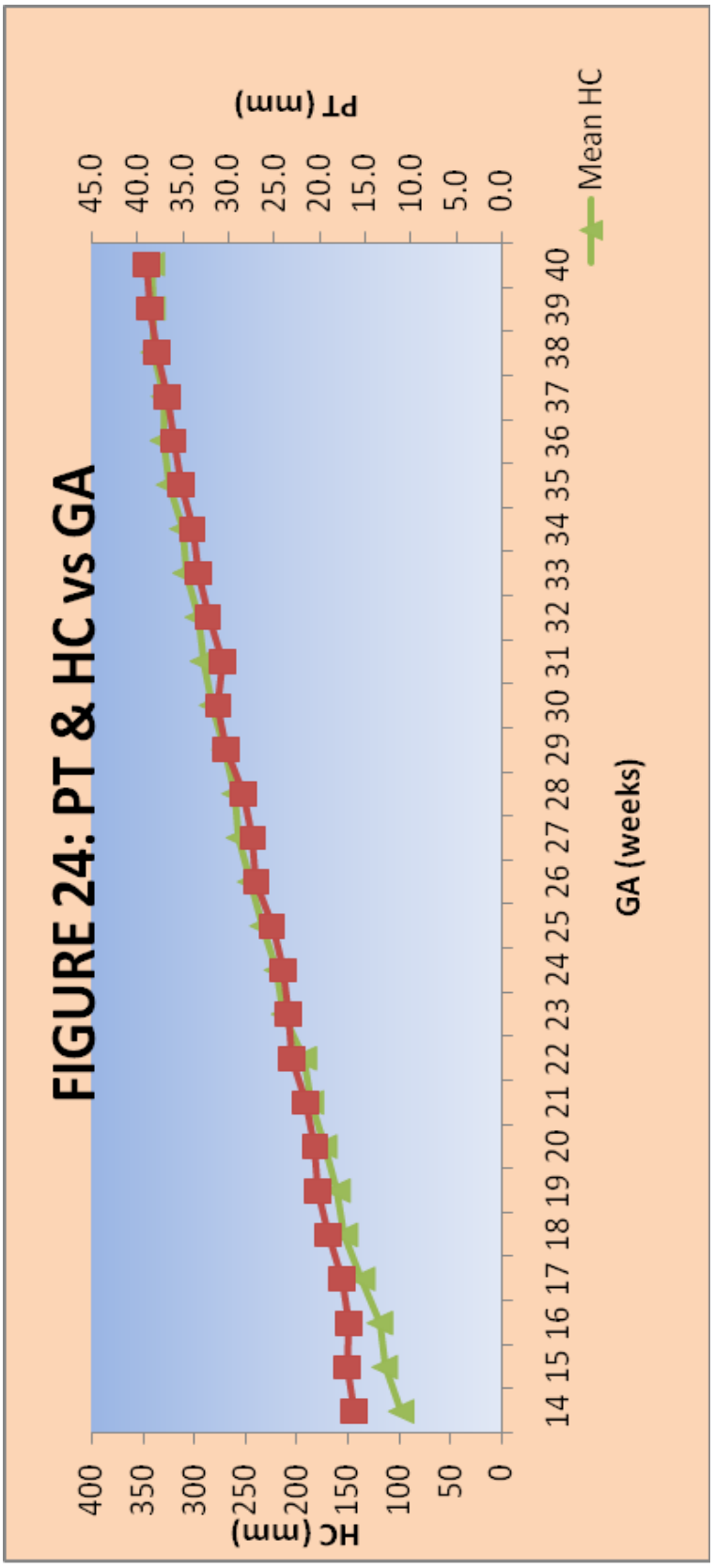


FIGURE 24: PT & HC vs GA
HC (mm)
PT (mm)
GA (weeks)
Mean HC
400
350
300
250
200
150
100
50
0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Table 9 :Placental Thickness vs Fetal Biometry

Sl.No.	Gestational Age (weeks)	Mean Placental Thickness(mm)	Mean BPD[mm]	Mean FL [mm]	Mean HC [mm]
1	11	14.6	-	-	-
2	12	14.9	-	-	-
3	13	15.3	-	-	-
4	14	16.1	27.8	15.0	98
5	15	16.9	30.7	18.5	114
6	16	16.7	28.4	22.1	119
7	17	17.5	41.1	25.9	136
8	18	19.0	42.3	29.3	153
9	19	20.2	43.9	31.4	160
10	20	20.4	46.8	34.8	173
11	21	21.5	49.7	36.0	186
12	22	22.9	52.8	37.4	193
13	23	23.3	57.5	42.1	212
14	24	23.9	60.1	41.9	219
15	25	25.1	64.0	48.4	233
16	26	26.9	66.3	46.2	245
17	27	27.3	68.8	50.1	256
18	28	28.3	71.1	53.8	260
19	29	30.2	74.9	57.4	270
20	30	31.0	77.2	58.7	282
21	31	30.6	76.7	58.0	291
22	32	32.1	80.1	63.3	296
23	33	33.2	83.6	65.0	308
24	34	33.8	84.2	66.1	311
25	35	35.1	83.0	66.6	324
26	36	35.9	89.5	69.8	330
27	37	36.6	89.0	69.1	329
28	38	37.7	92.7	71.7	339
29	39	38.5	94.2	74.7	340
30	40	38.9	94.3	76.1	341

Table 10 : Correlation between Placental Thickness and other variables

Variable	Correlation Coefficient(r^2) with Placental Thickness	'p'
Gestational Age	0.98	< 0.0001 Significant
Biparietal Diameter	0.93	< 0.0001 Significant
Femur Length	0.92	< 0.0001 Significant
Abdominal Circumference	0.91	< 0.0001 Significant
Head Circumference	0.22	< 0.0001 Significant
Crown Rump Length	0.35	0.0215 Significant

Pearson's correlation coefficient was used to assess the correlation and Student's 't' test used to test the significance of association between Placental thickness and other variables. There is a significant positive correlation between placental thickness and gestational age. Correlation coefficient is 0.98 and 'p' value<0.0001 . There is a significant positive correlation of placental thickness with other fetal biometry parameters like BPD, FL, AC, HC and CRL. Correlation coefficients are BPD{0.93}, FL{0.92}, AC{0.91}, HC{0.22}, and CRL{0.35}. P value is< 0.0001 for BPD,FL,AC and HC. 'P' value for CRL is 0.0215 .

Table 11 : Regression Equations for estimation of Gestational Age

a) Gestational Age = 1.061 x Placental Thickness - 1.749

b) Gestational Age = 0.037 x BPD + 2.654

c) Gestational Age = 0.042 x FL + 6.366

d) Gestational Age = 0.094 x AC + 5.838

e) Gestational Age = 0.031 x HC + 20.174

f) Gestational Age = 1.103 x CRL + 5.854

Univariate analysis was done.

DISCUSSION

In our study a total of 333 antenatal women of different gestational ages were studied for their placental thickness.

The mean values of placental thickness was calculated for different gestational ages from 11 – 40 weeks. It was observed that placental thickness gradually increased from 14.6mm at 11 weeks to 38.9mm at 40 weeks gestation.

In our study, the mean placental thickness was slightly in the higher range for the corresponding gestational age upto 19 weeks. From 20 weeks to 36 weeks of gestation the placental thickness in mm almost matched with corresponding gestational age in weeks. After 36 weeks , placental thickness started decreasing by 0.5 to 1mm to corresponding gestational age till 40 weeks. **Hellman et al[48] (1970)** explained that as placental growth ceases after 37 weeks the thickness becomes lesser in the last four weeks.

The present study assessed the relationship between gestational age and placental thickness.There appears to be a linear relationship between gestational age and placental thickness. As gestational age increases placental thickness also increases as reported by **Nyberg and Finberg[9] (1990).**

Our study results are consistent with observation made by **Mittal et al[26] (2002) and Aditi Tiwari [28](2013)** who reported placental thickness to match from 22 to 35 weeks of gestation.

Anupama jain et el [25](2001) also in their study reported that placental thickness matched gestational age from 27 to 33 weeks.

In our study there is a significant correlation between placental thickness and gestational age, assessed by Pearson correlation, the correlation coefficient is 0.98 and p value <0.0001.

Correlation between placental thickness and other fetal biometry like BPD, FL,AC and HC done using Pearson correlation.

In our study placental thickness almost had a positive correlation with other fetal biometry like BPD and FL . Correlation coefficient being 0.93 and 0.92 respectively with p value <0.0001 for both. This is consistent with **Karthikeyen et al[30] (2012)** study where he correlated placental thickness to other fetal biometry parameters. Our study results are also consistent with the Nigerian study done by **C C Ohagwu et al[29](2009)**

Study done by **Arafa Ahmed et al[31] (2014)** in Sudan proved a significant correlation between placental thickness, BPD and FL. Correlation coefficient are 0.80 and 0.85 respectively in their study.

In our study the correlation coefficient for AC and placental thickness is 0.91 and p value<0.0001. Correlation coefficient for HC and placental thickness is 0.22 and p value<0.0001.

Regression equation was calculated to measure gestational age with placental thickness as follows GA =1.061×PT-1.749.

Durnwald et al[36] (2004) quoted that the placental thickness in third trimester of posterior and fundal placenta are greater than anterior placenta. In our study the differences in placental thickness with regard to the location was analysed for each trimester. Association between placental thickness and placental location was done using student's `t' test. There was no significant relationship between placental thickness and placental location. 'p' value for first trimester is 0.2707, second trimester is 0.9508 and third trimester is 0.7035 which are not significant.

Lee et al[37] (2012) stated that there is a difference of about 7mm between anterior and posterior placentation. Placental location does not seem to affect the thickness in our study.

La torre et al[49](1979) opined that at no stage of pregnancy placental thickness exceeded 40mm. **Benrishke et al[50] (1998)** related that placental thickness > 40mm could represent

1. Diabetes
2. Intrauterine infection
3. Hydrops fetalis

Elchalal et al[38] (2000) analysed sonographically thick placenta [>4cm or >90th centile] is associated with increased perinatal mortality and morbidity like fetal anomalies, SGA or LGA infants at term. In our study none of the woman had placental thickness of more than 4cm.

Habib et al[32] (2002) studied that placental thickness < 2cm at 36 weeks could predict low birth wight. **Preeta Baghel and Vinita Baghel[51] (2015)** in their study also concluded that placental thickness < 2cm at 36 weeks predicts low birth weight. Placental thickness < 10th centile at 32 or 36 weeks could predict IUGR. **Dudley et al[52] (1993)** stated that placental thickness appears to be strongly associated with birth weight.

In the study population, total of 315 mothers out of 333 delivered in our hospital. All were term deliveries. There were 3 babies who displayed features of IUGR and 7 LBW babies which included 1 IUGR. IUGR assessment was done after birth by using CAN scoring. All of them had their scan done in their third trimesters and their placental thickness was found to be > 2cm .

Study by Afrakhteh[34](2013) stated that though birth weight has positive correlation with second and third trimester placental thickness change in the placental thickness could not predict low birth weight.

Tongsong et al[41] (1999) identified thick placenta in about 93.3% of women with cytomegalo virus infection. This observation can be integrated into antenatal management of suspected cases.

Hafner et al[53] (2006) stated that it is possible to predict chromosomal anomalies and preeclampsia with placental thickness and volume.

Table 12 :Comparison between My Study, Anupamajain & Mittal Study:

GA(Weeks)	Placental thickness-Mean (my study)(mm)	Placental thickness-Mean (Anupamajain study)(mm)	Placental thickness-Mean (Mittal study)(mm)
11	14.6	15.0	15.0
12	14.9	15.0	16.0
13	15.3	16.0	16.0
14	16.1	17.0	17.0
15	16.9	18.0	18.0
16	16.7	20.0	19.0
17	17.5	21.0	19.0
18	19.0	22.0	19.0
19	20.2	22.0	21.0
20	20.4	23.0	22.0
21	21.5	24.0	22.0
22	22.9	24.0	23.0
23	23.3	24.0	23.0
24	23.9	25.0	24.0
25	25.1	27.0	25.0
26	26.9	28.0	26.0
27	27.3	29.0	27.0
28	28.3	29.0	28.0
29	30.2	30.0	29.0
30	31.0	30.0	30.0
31	30.6	32.0	31.0
32	32.1	33.0	32.0
33	33.2	33.0	33.0
34	33.8	33.0	34.0
35	35.1	33.0	35.0
36	35.9	33.0	35.0
37	36.6	35.0	37.0
38	37.7	36.0	37.0
39	38.5	36.0	38.0
40	38.9		

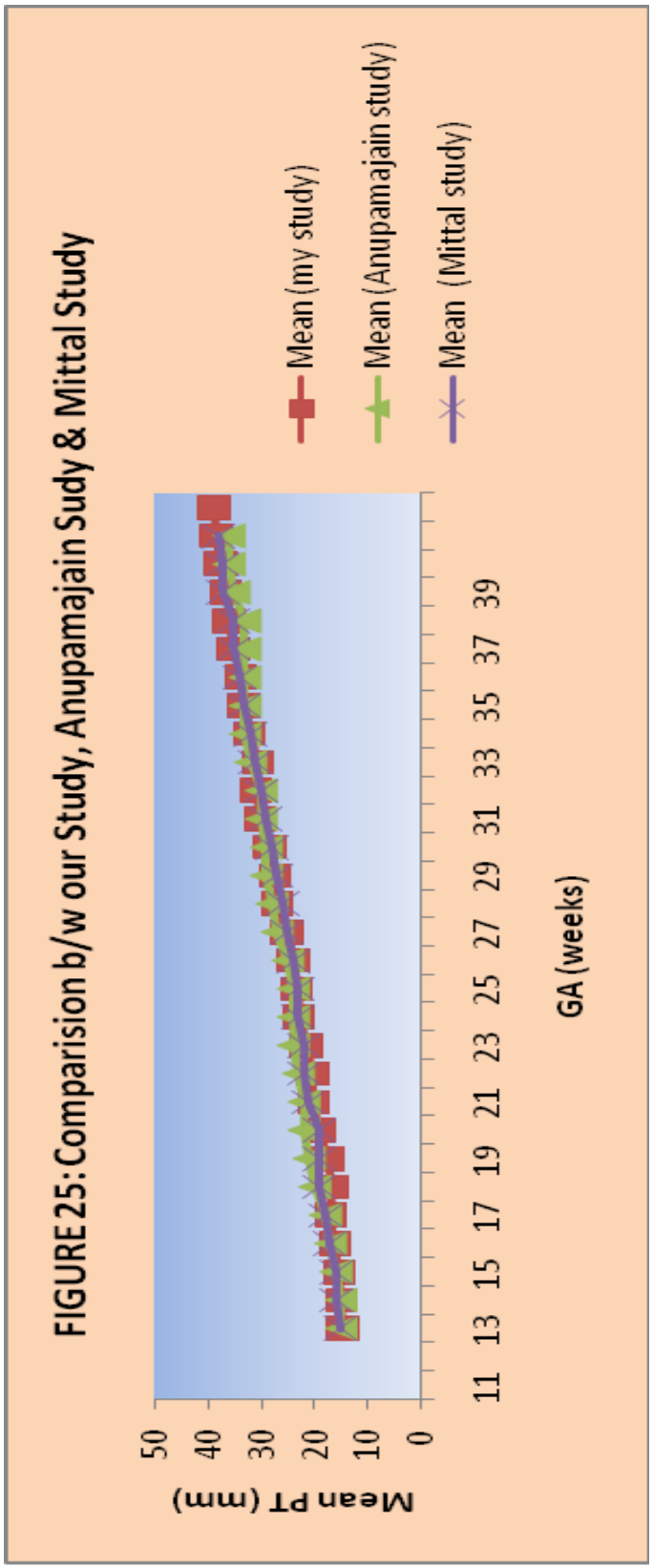


FIGURE 25: Comparision b/w our Study, Anupamajain Sudy & Mittal Study
Mean (my study)
Mean (Anupamajain study)
Mean (Mittal study)
Mean PT (mm)
0
10
20
30
40
50
11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
GA (weeks)

SUMMARY

Accurate estimation of gestational age is necessary

1. In scheduling screening for aneupoidy in first trimester and to do invasive procedures like chorionic villous sampling and amniocentesis.
2 In deciding the optimum time for anomly scan.
3 In assessing the interval growth of the fetus and to differentiate preterm from intra uterine growth restriction.
4 In deciding the timing of termination of pregnancy.

Most of the definitions in obstetrics like abortion, preterm and postterm depend on gestational age. Categorisation or classification of high risk pregnancy relies on the correct gestational age. For example, Gestational hypertension or Antepartum hemorrhage can be termed only after 20 weeks. If an anomaly is detected the mode of termination is planned according to gestational age.

It is very important to differentiate a preterm from a growth restricted baby as they differ both in their behaviour and complications. A discrepancy of even 2-3 weeks may be detrimental to a preterm baby who has to be delivered because of certain prevailing indication.

Most women come for their initial antenatal visit in the late second or early third trimester. As these clinical history and ultrasound parameters

becomes less accurate in 3rd trimester this study was conducted to find the accuracy of placental thickness in estimating gestational age even in second and third trimesters with good accuracy.

The normal placenta increases in volume throughout pregnancy. Studies measuring placental volume and gestational age of the fetus show a direct relationship between the placental volume and fetal growth parameters. But measurement of placental volume is too cumbersome and cannot be used in routine clinical practice. Placental thickness being relatively simple and easy can be studied for routine use in estimating gestational age of the fetus.

The major use of ultrasound in obstetrics is the estimation of gestational age. There is a discrepancy of 5 days in the first trimester. This discrepancy increases to 2 weeks in the second trimester where BPD, FL, HC and AC are used. In third trimester none of these parameters are accurate with the variation increasing to 2 to 3 weeks. These parameters are used in combination to assess the gestational age. Therefore there is a need for a parameter which accurately determines the gestational age even in the late second and third trimesters with minimal error.

From the above discussion it is evident that there is a significant correlation between placental thickness and gestational age. It appears that placental thickness can be reliably used to estimate gestational age

importantly for mothers whose clinical history is not reliable, who come for antenatal booking in the second half of pregnancy and in conditions where BPD measurements become less reliable.

USES OF PLACENTAL SONOGRAPHY:

- To determine gestational age in late second or third trimester when exact duration of pregnancy is not known.
- As a predictor for LBW[32-35]
- Prognostic value in identifying subsequent occurrence of IUGR[32,33,14,38].
- Placental thickness at mid pregnancy (18 -21 weeks) as a predictor of Hb Barts disease there by reducing the number of invasive diagnostic procedures[41,42].
- Placental volume measurement is used in predicting LBW, chromosomal anomalies, Abnormal Doppler and first trimester screening[45-47].

CONCLUSION

Diagnostic ultrasound is a non – invasive, safe and useful investigation sought by the obstetricians to clear the different dilemmas in the obstetrics. Particularly it is very much helpful in estimating the gestational age of the fetus. It is relatively simple, easy to perform and can be repeated and has shown to be free from risk to the mother and her unborn fetus.

Taipale et al[54] (2001) reported that the percentage of post term pregnancies decreased from 10.3% to 2.7% [‘p’<0.001] when USG was used instead of LMP dates.

The present study has shown a significant correlation between the placental thickness and gestational age from 20 to 36 weeks.

Placental volume measurements, though cumbersome could be ventured into because they correlate very well with first trimester screening parameters like PAPP-A and serum ßhCG.[45] **Hafner et al[46] (2001)** has proved the presence of small volume placentae in the first trimester who progressively had high resistance Dopplers in their second trimesters. This relationship could be used in the early identification of abnormal trophoblast invasion. Placental volume measurements correlate well with chromosomal anomalies also.

Dombrowski et al[14] (1992) stated that polyhydramnios may falsely decrease and oligohydramnios may falsely increase placental thickness measurements. Careful consideration of these variations must be known to the clinician. Further studies are required to quantify and correct these variations.

To conclude, one can say the measurement of placental thickness is an important parameter for estimation of fetal age. It is helpful in cases where the exact duration of pregnancy is not known, where the placental thickness almost matches with gestational age. It can also be used in low resource setting like a public health centre with minimal training. Measurement of placental thickness during obstetric ultrasound can be made as a routine practice. Including placental thickness into routine fetal biometry might improve pregnancy dating and might also minimize the discrepancy even late in second and third trimester. If the placental thickness is abnormal, causes for abnormal placental thickness should be borne in mind and carefully searched for.

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ABBREVIATIONS

LM P	:	Last Menstrual Period
OCP	:	Oral Contraceptive Pills
USG	:	Ultrasonogram
ART	:	Artificial Reproductive Technique
EDD	:	Estimated Date of Delivery
GA	:	Gestational Age
PT	:	Placental Thickness
hCG	:	Human Chorionic Gonadotropin
PDA	:	Patent Ductus Arteriosus
BPD	:	Biparietal Diameter
HC	:	Head Circumference
AC	:	Abdominal Circumference
FL	:	Femur Length
CRL	:	Crown Rump Length
MHz	:	Mega Hertz
AIUM	:	American Institute of Ultrasound in Medicine
ALARA	:	As Low As Reasonably Achievable
DNA	:	Deoxy Ribonucleic Acid
MTP	:	Medical Termination of Pregnancy
LSCS	:	Lower Segment Cesarean Section
MSD	:	Mean Sac Diameter
PROM	:	Premature Rupture of Membranes
AP	:	Anteroposterior
TCD	:	Transverse Cerebellar Diameter
IUGR	:	Intrauterine Growth Restriction
DM	:	Diabetes Mellitus

BMI	:	Body Mass Index
SLE	:	Systemic Lupus Erythematosus
Hb	:	Haemoglobin
PAPP – A	:	Pregnancy Associated Plasma Protein–A
OPD	:	Out Patient Department
SGA	:	Small for Gestational Age
LGA	:	Large for Gestational Age
LBW	:	Low Birth Weight
CANS	:	Clinical Assessment of Nutrition Status

PROFORMA

Title : Ultrasonographic Placental Thickness - its correlation to Gestational Age.

Name : Age : Insurance No.

LMP : EDD : Gestational age

Menstrual History : Cycles – Regular / Irregular,

Obstetrics History

Medical Disorders :

USG Done on :

CRL : _____ mm _____ Weeks

BPD : _____ mm _____ Weeks

FL : _____ mm _____ Weeks

HC : _____ mm _____ Weeks

AC : _____ mm _____ Weeks

Placental Thickness :

Placental Location :

Any Other :

Impression _____ Live Fetus _____

Weeks of Gestation :

Signature of Investigator Signature of the Patient

Witness :

1.

2.

ஒப்புதல் படிவம்

ஆய்வு தலைப்பு : **Ultrasonographic placental thickness - its correlation to gestational age**

மருத்துவமனை : இ.எஸ்.ஐ. மருத்துவ கல்லூரி மருத்துவமனை,
கே. கே. நகர், சென்னை- 600 078.

பெயர் :

வயது :

பாலினம் :

நான் இந்த ஆய்விற்கான முழுமையான காரணத்தை புரிந்து கொண்டேன். என்னுடைய கேள்விகளுக்கு முழுமையான பதில் அளிக்கப்பட்டது. எந்த கேள்வி கேட்கவும் எனக்கு முழு வாய்ப்பு அளிக்கப்பட்டுள்ளது.

இந்த அல்ட்ராசவுண்டு ஸ்கேன் முறை பற்றி எனக்கு முழுமையாக எடுத்துரைக்கப்பட்டது. இதனுடைய நன்மை, தீமை அனைத்தையும் நான் நன்கு அறிவேன். நான் எப்பொழுது வேண்டுமானாலும் முன் அறிவிப்பு இன்றி இந்த ஆய்விலிருந்து விலகிக் கொள்ளலாம் என்று எனக்கு தெரிவிக்கப்பட்டது.
என்னுடைய சமமதம் இன்றி என் மருத்துவ பதிவேடுகளை பிற ஆய்வுக்காக பயன்படுத்திக் கொள்ளலாம் என தெரிந்து கொண்டேன். என்னுடைய பெயரோ, புகைப்படமோ எந்த ஒரு காரணத்திற்காகவும் வெளியில் தெரிவிக்கப்படமாட்டாது என்று தெரிந்து கொண்டேன்.

காப்பீடு எண்.
தேதி

நோயாளியின்
கையெழுத்து/ இடது கை ரேகை

PATIENT CONSENT FORM

Study title : **"Ultrasonographic placental thickness - its correlation to gestational age"**

Study centre : ESI — PGIMSR, K.K.NAGAR, CHENNAI -78

Participant name : Age : Sex :

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I have been explained about the pitfall in the procedure. I have been explained about the safety, advantage and disadvantage of the technique. I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason.

I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law I agree not to restrict the use of any data or results that arise from the study .

Insurance No:

Date:

Signature / thumb impression of patient

Placental Thickness_ Its correlation to Gestational Age																	
S NO	NAME	AGE	INS-NO	OBS-SCORE	LMP	EDD	SCAN DATE	GA (weeks + Days)	BPD (mm)	HC (mm)	AC (mm)	FL (mm)	CRL (cm)	LOCATION	PT (mm)	BIRTH WEIGHT (kg)	IUGR
1	MONICKA	21	5122452640	PRIMI	6/18/2014	3/25/2015	11/6/2014	20+1	49.0	177	161	36.0		ANTERIOR	19.5	3.54	
2	SRUTHI	27	5114664780	G2P1L1	6/12/2014	3/19/2015	11/6/2014	21+0	50.8	181	150	32.8		POSTERIOR	20.5	2.56	
3	KAVITHA	30	5122180803	G3P1L1A1	7/29/2014	5/5/2015	11/7/2014	14+3	29.6	98	148	15.0		FUNDAL	16.6	2.65	
4	SANGEETHA	24	5121819308	PRIMI	6/5/2014	3/12/2015	11/7/2014	22+1	51.8	182	178	38.9		POSTERIOR	22.2	3.43	
5	AYYAMMAL	34	5113265735	G2P1L1	5/18/2014	2/25/2015	11/8/2014	24+6	62.3	219	197	41.3		ANTERIOR	24.5	2.55	
6	ALLIS PUSHPARANI	33	5120666284	G3P1L0A1	6/29/2014	4/6/2015	11/10/2014	19+1	44.0	160	140	29.6		POSTERIOR	19.9	2.67	
7	SANTHIYA	23	5117272795	G3A2	8/10/2014	5/17/2015	11/10/2014	13+1					6.5	ANTERIOR	14.8		
8	SATHYA	19	5115586168	PRIMI	7/11/2014	4/18/2015	11/11/2014	17+4	42.1	134	136	26.8		ANTERIOR	16.7		
9	SARASWATHI	24	5115585882	PRIMI	3/21/2014	12/28/2014	11/12/2014	33+3	80.9	292	296	66.5		POSTERIOR	34	2.96	
10	ANANTHI	35	5116633624	G2P1L1	5/12/2014	2/19/2015	11/15/2014	26+5	67.8	232	241	49.7		ANTERIOR	27.7	2.54	
11	VELLAIAMMAL	21	5116248076	PRIMI	6/28/2014	4/5/2015	11/17/2014	20+2	46.7	167	160	32.6		POSTERIOR	19.9	2.67	
12	VASANTHI	30	5114445960	G4P2L2A1	6/17/2014	3/24/2015	11/18/2014	22+0	50.0	185	164	37.0		POSTERIOR	21.4	2.58	
13	REVATHY	30	5112398981	PRIMI	6/21/2014	3/28/2015	11/19/2014	21+4	51.7	172	173	38.1		POSTERIOR	21.7	2.79	
14	TAMILSELVI	32	5113857192	G2P1L1	6/18/2014	3/25/2015	11/19/2014	22+0	51.0	189	171	37.6		FUNDAL	22.2	3.54	
15	BHAVANI	33	5114732071	PRIMI	6/27/2014	4/4/2015	11/20/2014	20+6	52.0	172	147	36.0		ANTERIOR	21.1	3.45	
16	KAVITHA	23	5120628397	PRIMI	6/20/2014	3/27/2015	11/20/2014	20+0	48.6	163	160	36.5		POSTERIOR	19.1	3.33	
17	LILY	29	5114829324	PRIMI	5/9/2014	2/16/2015	11/20/2014	27+3	74.8	239	243	53.0		POSTERIOR	27.9	2.89	
18	PADMA PRIYA	23	5120503715	G2P1L1	8/23/2014	5/30/2015	11/20/2014	12+5					6	ANTERIOR	15.1	2.54	
19	MAHALAKSHMI	27	5114960024	PRIMI	6/15/2014	3/22/2015	11/21/2014	22+5	52.6	190	205	40.7		ANTERIOR	23.1	3.43	
20	MAHARIBA BEGUM	31	5122260236	G2P1L1	8/26/2014	6/2/2015	11/21/2014	12+3					5.9	ANTERIOR	14.7	3.21	
21	PUNITHA	28	5120913624	PRIMI	6/6/2014	3/13/2015	11/21/2014	24+0	63.0	229	201	41.3		ANTERIOR	24.1	3.11	
22	ANITHA	32	5115924835	G2P1L1	7/6/2014	4/13/2015	11/24/2014	20+1	50.4	182	163	33.7		ANTERIOR	19.4	3.18	
23	MONICKA	28	5117296592	G2P1L1	6/22/2014	3/29/2015	11/24/2014	22+1	46.2	193	182	36.3		POSTERIOR	23.8	3.93	
24	BHUVANESHWARI	28	5114731269	PRIMI	7/21/2014	4/28/2015	11/25/2014	18+1	42.2	144	137	29.0		POSTERIOR	18.9	3.36	
25	DEVI	31	5122306550	G3P2L1	6/27/2014	4/4/2015	11/26/2014	21+5	50.4	189	171	36.0		ANTERIOR	22.3	2.67	
26	GEETHA	31	5123826062	PRIMI	7/12/2014	4/19/2015	11/26/2014	19+4	44.6	162	143	32.4		POSTERIOR	20.3	2.87	
27	PARVATHI	30	5123341362	G2P1L1	7/14/2014	4/21/2015	11/26/2014	19+2	44.0	155	141	32.1		ANTERIOR	20		

28	SUBBULAKSHMI	25	5121562750	PRIMI	9/10/2014	6/17/2015	11/26/2014	11+0					5.1	POSTERIOR	14.1	2.54	
29	SUGANYA	23	5120849282	G2P1L1	9/1/2014	6/8/2015	11/26/2014	11+6					5.4	POSTERIOR	14.4		
30	LATHA	28	NGO-682	PRIMI	9/1/2014	6/8/2015	11/28/2014	12+5					6.2	ANTERIOR	16.6	2.68	
31	SUJITHRA DEVI	27	5120625284	G3P1L1A1	9/13/2014	6/20/2014	12/1/2014	11+2					5.2	POSTERIOR	14.8	2.54	
32	JAYANTHI	22	5121159563	PRIMI	8/24/2014	5/31/2015	12/3/2014	14+3	25.1	99	145	14.7		POSTERIOR	16.1	2.76	
33	KAVITHA	32	5115873634	G2P1L1	7/7/2014	4/14/2015	12/3/2014	21+2	48.0	182	156	36.0		ANTERIOR	20.5	2.58	
34	SHAKILA	33	5129035468	G3P1L0A1	6/29/2014	4/6/2015	12/5/2014	22+5	58.0	196	183	40.0		ANTERIOR	22.2	2.76	
35	RATHINA	26	5151501081	PRIMI	8/20/2014	5/27/2015	12/5/2014	15+2	29.8	112	158	17.2		ANTERIOR	16.5	2.56	
36	FARITHA	24	5120751758	PRIMI	6/14/2014	3/21/2015	12/6/2014	25+0	63.7	222	203	43.0		POSTERIOR	25.4	2.68	
37	SUMATHI	37	5115673290	G3P1L1A1	9/15/2014	5/22/2015	12/8/2014	11+6					5.4	ANTERIOR	14.6	3.67	
38	ANANTHI	23	5122821597	G2A1	7/4/2014	4/11/2015	12/8/2014	22+3	51.7	199	182	39.8		ANTERIOR	22	3.76	
39	DEVAGI POWLINA	26	5122875539	G3P1L1A1	7/13/2014	4/20/2015	12/9/2014	21+2	48.1	194	155	36.2		POSTERIOR	20.9	3.22	
40	BHUVANESWARI	27	5116845453	G2P1L1	5/16/2014	2/23/2015	12/10/2014	28+2	73.0	245	262	54.1		POSTERIOR	29	3.15	
41	JAYASUDHA	28	5122117477	G2P1L1	7/20/2014	4/27/2015	12/12/2014	20+5	52.0	179	168	31.0		POSTERIOR	21	2.65	
42	YUVARANI	26	5116518851	G2P1L1	7/10/2014	4/17/2015	12/15/2014	22+4	53.2	200	182	39.0		ANTERIOR	24.5	2.85	
43	DEVI	30	5115163051	PRIMI	5/26/2014	3/2/2015	12/17/2014	29+2	75.4	253	289	56.0		ANTERIOR	30.1	3.7	
44	MANJULA	32	5115135883	PRIMI	6/11/2014	3/18/2015	12/17/2014	27+0	72.0	247	242	51.8		POSTERIOR	27.7	2.76	
45	SATHYA	29	5122374694	G2P1L1	6/17/2014	3/24/2015	12/17/2014	26+1	68.0	235	212	49.2		POSTERIOR	28.2	3.18	
46	JYOTHI	28	5120986756	PRIMI	6/6/2014	3/13/2015	12/19/2014	28+0	67.8	248	211	49.0		ANTERIOR	28	2.56	
47	DIANA	21	5116276545	PRIMI	6/28/2014	4/5/2015	12/19/2014	24+6	62.5	214	196	45.5		POSTERIOR	25.1	3.44	
48	REVATHY	28	5114456592	G3P1L1A1	7/22/2014	4/29/2015	12/20/2014	21+4	51.0	178	169	36.0		ANTERIOR	22.1	2.96	
49	ANITHA	24	5116900710	PRIMI	5/26/2014	3/2/2015	12/22/2014	30+0	73.0	264	250	60.1		POSTERIOR	31	2.78	
50	GOMATHY	26	5122626521	G2P1L1	7/14/2014	4/21/2015	12/23/2014	23+1	56.0	190	203	43.0		ANTERIOR	24.9	2.57	
51	VIJAYALAKSHMI	22	5120312727	PRIMI	5/8/2014	2/15/2015	12/23/2014	32+5	78.7	279	291	65.7		POSTERIOR	33.1	3.41	
52	ANANDHI	30	5122446574	G3P1L1A1	7/29/2014	5/5/2015	12/27/2014	21+4	46.0	192	177	36.0		ANTERIOR	20.5	2.87	
53	PRIYA	23	5123519663	PRIMI	7/2/2014	4/9/2015	12/27/2014	25+3	62.8	229	198	38.1		POSTERIOR	25.7	2.65	
54	MANJULA	29	5117223544	G4P1L1A2	9/7/2014	6/14/2015	12/29/2014	16+1	28.4	119	163	22.1		ANTERIOR	16.7	2.65	
55	REKHA	31	5123575109	G2P1L1	7/17/2014	4/24/2015	12/29/2014	23+4	58.0	192	173	42.0		ANTERIOR	25.1	3.08	
56	GEETHA	29	NGO-123718	PRIMI	4/18/2014	1/25/2015	12/30/2014	36+2	94.8	327	336	73.4		POSTERIOR	36	3.34	

57	KALAYARASI	28	5112877490	G2P2L1	7/24/2014	5/1/2015	12/31/2014	22+6	52.6	219	166	38.2		ANTERIOR	23.9	2.87	
58	SULOCHANA	40	5116456837	G2A1	8/11/2014	5/18/2015	12/31/2014	20+2	39.7	164	157	37.1		POSTERIOR	20.7	2.68	
59	JAYASUDHA	26	5120756207	PRIMI	6/5/2014	3/12/2015	1/2/2015	30+1	75.1	268	264	62.7		POSTERIOR	32	2.58	
60	UDAYA	23	5117834569	G3A2	8/10/2014	5/17/2015	1/2/2015	20+5	48.3	169	148	34.6		ANTERIOR	21.3	2.66	
61	VASANTHALAKSHMI	29	5120737827	PRIMI	8/30/2014	6/6/2015	1/2/2015	21+2	48.0	184	176	37.0		POSTERIOR	21.3	2.78	
62	VALLI	29	5116381881	G2P1L1	4/17/2014	1/24/2015	1/3/2015	37+0	85.0	314	328	70.0		ANTERIOR	37.5	2.67	
63	PAPITHA	21	5120560322	PRIMI	9/3/2014	6/10/2015	1/5/2015	17+5	40.0	138	133	25.0		POSTERIOR	18.2	2.6	
64	ABITHA BEGUM	33	5117204910	G3P1L1A1	7/21/2014	4/28/2015	1/6/2015	24+0	54.7	210	193	43.0		POSTERIOR	23.2		
65	DEVI	32	5115104731	G2P1L1	8/8/2014	5/15/2015	1/7/2015	21+5	54.3	196	160	38.7		ANTERIOR	21.9	2.56	
66	PRISCILLA	31	5120115451	G2P1L1	6/11/2014	3/18/2015	1/7/2015	29+3	74.8	256	260	61.5		ANTERIOR	30.2	2.76	
67	RAMALAKSHMI	26	5122741203	G2P1L1	8/13/2014	5/20/2015	1/7/2015	21+0	47.3	187	164	35.7		POSTERIOR	20.8	2.74	
68	JAYASREE	22	5112287769	PRIMI	8/24/2014	5/31/2015	1/10/2015	19+6	42.9	170	140	30.6		ANTERIOR	21.1	2.56	
69	SHEELA DEVI	28	5123009549	G3P1L1A1	9/2/2014	6/9/2015	1/10/2015	18+4	42.0	156	140	28.0		POSTERIOR	19.1	2.67	
70	JAYANTHI RANI	23	5122645673	G2A1	7/4/2014	4/11/2015	1/12/2015	27+3	63.4	244	212	38.4		ANTERIOR	27.9	2.88	
71	NAZOOR MEERA	29	5122534974	G2P1L1	8/18/2014	5/25/2015	1/12/2015	21+0	53.4	188	158	32.0		POSTERIOR	22	2.87	
72	THARANI	19	5146789667	PRIMI	7/11/2014	4/18/2015	1/12/2015	26+3	63.2	249	200	37.8		ANTERIOR	26	2.76	
73	NAJIMA	31	5121637391	G3P1L1A1	8/23/2014	5/30/2015	1/13/2015	20+3	45.1	190	133	36.3		POSTERIOR	20.7	2.94	
74	SANGEETHA	22	5123457450	PRIMI	8/11/2014	5/18/2015	1/13/2015	22+1	46.4	229	181	36.4		POSTERIOR	22.6	3.45	
75	SANGEETHA	28	5120088285	PRIMI	10/8/2014	7/15/2015	1/13/2015	13+6					7.2	FUNDAL	16	3.36	
76	PARIMALA DEVI	29	5122099180	G2P1L1	8/5/2014	5/12/2015	1/17/2015	23+4	56.0	194	178	43.2		ANTERIOR	23	2.95	
77	SITHI FATHIMA	22	5122671496	G2P0E1	9/6/2014	6/13/2015	1/17/2015	19+0	44.2	153	140	32.1		POSTERIOR	19.5	3.15	
78	AARYA	21	5112764567	PRIMI	6/28/2014	4/5/2015	1/19/2015	29+2	73.0	259	265	56.0		ANTERIOR	31.1	2.93	
79	JEYABARATHI	29	5124466859	PRIMI	4/18/2014	1/25/2015	1/20/2015	39+2	96.5	323	345	76.6		ANTERIOR	38.1	2.91	
80	MARGARET	30	5114476639	G4P2L2A1	6/17/2014	3/24/2015	1/20/2015	31+0	74.4	274	248	54.6		POSTERIOR	30.8	2.98	
81	GAYATHRI	21	5123613117	G2P1L1	6/21/2014	3/28/2015	1/21/2015	30+4	82.7	269	260	63.6		ANTERIOR	31.8	3.41	
82	NASREEN	23	5120567815	G2P1L1	8/23/2014	5/30/2015	1/21/2015	21+4	46.0	198	178	36.2		POSTERIOR	20.9	3.23	
83	ANURADHA	24	5122987098	PRIMI	6/5/2014	3/12/2015	1/21/2015	32+4	75.0	280	252	53.4		POSTERIOR	33	2.87	
84	VANISREE	23	5114933484	G2P1L1	9/4/2014	6/11/2015	1/21/2015	20+0	43.0	176	167	35.0		ANTERIOR	19.7	2.59	
85	ADHILAKSHMIGAND	31	5121937337	G3P2L2	9/4/2014	6/11/2015	1/22/2015	20+0	39.2	182	170	38.0		ANTERIOR	19.3	2.54	

86	MANIMALA	27	5116924213	G2P1L1	8/9/2014	5/16/2015	1/22/2015	23+5	56.1	196	187	43.5		ANTERIOR	23.2	2.87	
87	SELVI	27	5113468993	G3P1L1A1	8/30/2014	6/6/2015	1/22/2015	20+5	49.3	167	154	36.0		POSTERIOR	20.9	3.15	
88	JAYALAKSHMI	28	5117287690	G2P1L1	6/22/2014	3/29/2015	1/23/2015	30+5	79.4	271	263	57.8		FUNDAL	31.9	2.65	
89	PRIYA	26	5122415222	PRIMI	9/3/2014	6/10/2015	1/23/2015	20+2	43.5	169	168	35.2		ANTERIOR	20.1	2.56	
90	LINDA	27	5120876597	G3P1L1A1	9/13/2014	6/20/2015	1/23/2015	18+6	40.6	160	138	30.9		ANTERIOR	19.5	2.66	
91	SUMATHI	35	5121121714	G5P1L1A3	8/23/2014	5/30/2015	1/25/2015	22+1	54.4	190	160	40.8		POSTERIOR	22.4	2.76	
92	JAYASATHYA	25	5116833964	PRIMI	10/7/2014	7/14/2015	1/27/2015	15+6	31.5	115	168	19.7		POSTERIOR	17.3	2.65	
93	SIVASANKARI	27	5114967854	PRIMI	6/15/2014	3/22/2015	1/27/2015	32+2	83.0	282	269	64.4		ANTERIOR	31	2.92	
94	SUMITHRA	31	5124563876	G2P1L1	8/26/2014	6/2/2015	1/27/2015	22+0	54.5	196	162	41.3		ANTERIOR	23.1	2.76	
95	SHARMILA	21	5122456345	PRIMI	6/18/2014	3/25/2015	1/27/2015	31+6	81.0	278	285	62.8		ANTERIOR	31.6	2.58	
96	SELVI	35	5123698823	PRIMI	6/10/2014	3/17/2015	1/27/2015	33+0	85.2	294	281	66.3		ANTERIOR	33.3	2.6	1
97	VASANTHI	24	5122653879	PRIMI	5/26/2014	3/2/2015	1/28/2015	35+2	82.2	305	310	69.5		ANTERIOR	33.8	2.59	
98	NATHIYA	30	5123389760	G2P1L1	7/14/2014	4/21/2015	1/28/2015	28+2	73.5	250	254	55.4		POSTERIOR	27.5	2.56	
99	PREMA	18	5115912229	PRIMI	9/4/2015	6/11/2015	1/28/2015	20+6	41.3	173	169	28.9		POSTERIOR	21.5	2.88	
100	SOUNDARYA	40	5115670985	G2A1	8/11/2014	5/18/2015	1/28/2015	24+2	58.7	222	184	38.7		ANTERIOR	22.1	2.98	
101	BHUVANE	28	5121531709	G3P2L2	9/4/2014	6/11/2015	1/29/2015	21+0	44.7	190	175	36.8		POSTERIOR	21.5	2.78	
102	PUNITHAVATHI	26	5120675468	PRIMI	6/5/2014	3/12/2015	1/29/2015	34+0	85.7	293	309	70.0		ANTERIOR	33	3.37	
103	ELAVARASI	26	5151513567	PRIMI	8/20/2014	5/27/2015	1/29/2015	23+1	57.0	198	178	42.0		POSTERIOR	23	2.52	
104	BARGATH	24	5120785679	PRIMI	6/14/2014	3/21/2015	1/30/2015	32+6	83.9	284	303	61.8		ANTERIOR	32	3.36	
105	GAYATHRI	23	5120675489	PRIMI	6/20/2014	3/27/2015	1/30/2015	30+1	82.6	274	258	63.5		POSTERIOR	30.5	2.51	
106	ROHINI	23	5123148769	PRIMI	7/2/2014	4/9/2015	1/30/2015	30+2	79.0	277	256	57.1		POSTERIOR	30.4	2.64	
107	SAROJA	28	5122479896	PRIMI	6/6/2014	3/13/2015	1/30/2015	33+0	85.0	296	280	66.6		ANTERIOR	32.9	3.18	
108	ADHILAKSHMI	29	5122737082	G3P1L1A1	9/4/2014	6/11/2015	2/2/2015	21+4	46.4	184	153	33.1		ANTERIOR	21.7	2.56	
109	POORNIMA	27	5145276549	G2P1L1	5/16/2014	2/23/2015	2/2/2015	35+6	84.8	310	306	65.6		POSTERIOR	36	2.85	
110	GAJALAKSHMI	26	5123091124	PRIMI	9/2/2014	6/9/2015	2/2/2015	20+6	48.0	178	160	34.2		POSTERIOR	21.6	2.56	
111	LAKSHMI	25	5114292455	G2P1L1	8/1/2014	5/8/2015	2/2/2015	25+3	58.2	231	198	45.0		ANTERIOR	25	2.76	
112	NARAYANI	35	5122121432	G2P1L1	8/25/2014	6/2/2015	2/2/2015	23+0	55.0	200	194	40.6		ANTERIOR	20.8	3.48	
113	NITHYA	31	5123865467	PRIMI	7/12/2014	4/19/2015	2/3/2015	29+5	75.0	261	263	57.0		ANTERIOR	31.5	2.63	
114	KALYANI	20	5116767343	G3P2L2	8/25/2014	6/1/2015	2/3/2015	22+1	54.0	194	160	34.5		POSTERIOR	22.8	2.79	

115	SUDHA	30	5122465890	PRIMI	6/21/2014	3/28/2015	2/3/2015	32+3	82.0	286	313	63.3		POSTERIOR	31.1	2.24	
116	AMIRTHAM	37	5116108761	G3P1L1A1	9/15/2014	5/22/2015	2/4/2015	20+1	47.0	164	154	33.4		ANTERIOR	19.9	2.97	
117	RAJALAKSHMI	25	5116038095	PRIMI	9/8/2014	6/15/2015	2/4/2015	21+2	53.0	191	145	37.7		POSTERIOR	21.7	2.89	
118	JAYA	25	5121589676	PRIMI	9/10/2014	6/17/2015	2/4/2015	21+0	44.7	179	166	35.4		ANTERIOR	22.3	2.87	
119	VETRI SELVI	32	5122567856	G2P1L1	6/18/2014	3/25/2015	2/4/2015	33+0	81.2	299	280	63.3		POSTERIOR	33.4	2.66	
120	VASANTHA	21	5122287145	PRIMI	6/28/2014	4/5/2015	2/4/2015	31+4	80.0	293	275	61.0		POSTERIOR	31.5	2.61	
121	JASMINE BEULAH	27	5120959505	G2P1L1	6/10/2014	3/17/2015	2/5/2015	34+2	85.0	296	299	65.0		POSTERIOR	34.4	3.21	
122	JEEVITHA	21	5123736696	PRIMI	9/1/2014	6/8/2015	2/5/2015	22+3	54.7	187	169	35.1		ANTERIOR	23.3	2.65	
123	MALARVIZHI	25	5116731474	PRIMI	8/27/2014	6/3/2015	2/5/2015	23+1	60.0	203	185	41.0		POSTERIOR	25.3	2.53	
124	TAMARAIKANI	33	5123678542	G3P1L1A1	7/21/2014	4/28/2015	2/6/2015	28+4	70.5	254	241	50.8		ANTERIOR	29.3	2.76	
125	NOORBEEVI	28	5132334588	G2P2L1	7/24/2014	5/1/2015	2/6/2015	28+1	70.0	252	230	54.0		ANTERIOR	29.6	2.58	
126	ROJA	20	5121235405	G3P1L1A1	8/27/2014	6/3/2015	2/6/2015	23+2	60.5	206	185	41.0		POSTERIOR	23	2.59	
127	SHALINI	26	EMPID163652	PRIMI	11/11/2014	8/18/2015	2/6/2015	11+6					5.4	ANTERIOR	15.1	3.68	
128	KAVITHA	26	NGO-734	G2A1	7/25/2014	5/2/2015	2/7/2015	28+1	71.0	256	252	51.0		ANTERIOR	29.9	2.62	
129	SIVAKUMARI	32	5123958413	G2P1L1	7/15/2014	4/22/2015	2/7/2015	29+4	73.2	263	268	54.7		POSTERIOR	30	2.65	
130	SHOBANA	32	5117196387	PRIMI	9/9/2014	6/16/2015	2/8/2015	21+5	47.0	180	167	34.3		ANTERIOR	20.9	2.67	
131	POONGODI	28	5123165496	PRIMI	7/21/2014	4/28/2015	2/10/2015	29+1	81.5	266	250	62.4		POSTERIOR	29.8	2.81	
132	MOHANA	30	5115127864	PRIMI	5/26/2014	3/2/2015	2/10/2015	37+1	84.7	316	292	65.6		ANTERIOR	36.5	2.79	
133	JERINA	26	5122624567	G2P1L1	7/14/2014	4/21/2015	2/10/2015	30+1	75.1	279	266	60.7		POSTERIOR	29.9	3.41	
134	MANIMEGALAI	34	5117707905	G2P1L1	6/18/2014	3/25/2015	2/10/2015	33+6	87.0	301	314	71.1		ANTERIOR	32.7	3.1	
135	NAGAMMAI	28	5121180467	G2P1L1	9/7/2014	6/14/2015	2/10/2015	22+2	50.9	192	165	32.0		POSTERIOR	23.6	3.32	
136	SHABANA	28	5114210007	G2P1L1	9/8/2014	6/15/2015	2/10/2015	22+1	55.2	188	173	38.1		ANTERIOR	21.5	2.77	
137	SUMATHI	27	5122325973	PRIMI	8/26/2014	6/2/2015	2/10/2015	23+0	57.0	208	164	40.7		POSTERIOR	23.5	2.83	
138	SARANYA	24	5116266079	PRIMI	8/28/2014	6/4/2015	2/11/2015	23+6	60.8	211	186	41.5		POSTERIOR	24.5	2.85	
139	JENCY CYNTHIA	23	5111455890	G2P1L1	9/1/2014	6/8/2015	2/11/2015	23+2	53.6	214	181	40.3		ANTERIOR	23.8	2.87	
140	MAHESHWARI	32	5122752115	G4P1L1A2	9/5/2014	6/12/2015	2/12/2015	20+6	45.1	168	131	36.5		FUNDAL	21.9	3.16	
141	SUJATHA	29	5121530361	PRIMI	8/15/2014	5/22/2015	2/12/2015	26+0	65.4	241	207	48.7		POSTERIOR	27.9	3.34	
142	VASANTHA KUMARI	20	5115680111	PRIMI	6/20/2014	3/27/2015	2/12/2015	33+6	83.5	303	298	63.7		POSTERIOR	32.5	2.67	
143	AMMU	29	5114184051	PRIMI	7/22/2014	4/29/2015	2/13/2015	29+3	75.0	269	268	54.8		ANTERIOR	30	2.59	

144	THILAGAVATHI	28	5114446579	G3P1L1A1	7/22/2014	4/29/2015	2/14/2015	29+4	70.8	272	280	57.1		ANTERIOR	31.2	2.53	
145	DHANALAKSHMI	23	5121678923	G2A1	7/4/2014	4/11/2015	2/16/2015	32+3	86.5	288	312	67.4		POSTERIOR	32.3	3.43	
146	PANDIYAMMAL	32	5124543675	G2P1L1	7/6/2014	4/13/2015	2/16/2015	32+1	86.3	290	309	67.7		POSTERIOR	32	2.67	
147	KALAI	24	5122231998	PRIMI	9/12/2014	6/19/2015	2/18/2015	21+5	47.0	183	167	34.3		ANTERIOR	22.5	2.51	
148	SHYLABANU	32	5115764589	G2P1L1	7/7/2014	4/14/2015	2/18/2015	32+2	81.8	293	259	61.7		ANTERIOR	32.1	2.76	
149	SAIPRIYA	33	5116899294	G3P1L1A1	10/15/2014	7/22/2015	2/18/2015	18+0	44.3	152	144	29.1		POSTERIOR	18.3	2.55	
150	SURIYAKUMARI	19	5121430684	PRIMI	12/3/2014	9/10/2015	2/19/2015	11+1					4.7	ANTERIOR	14.6	3.37	
151	SUDHA	30	5116578945	G4P2L2A1	6/17/2014	3/24/2015	2/19/2015	35+2	84.0	307	333	67.0		POSTERIOR	35.1	2.79	
152	SHANTHA	31	5122875396	G3P2L1	6/27/2014	4/4/2015	2/20/2015	34+0	84.0	299	270	69.7		ANTERIOR	34.5	3.21	
153	SINDHU	21	5114593477	PRIMI	9/18/2014	6/25/2015	2/20/2015	22+1	54.4	189	138	38.7		POSTERIOR	25.2	2.83	
154	SUGANYA	22	5123674873	PRIMI	11/27/2014	9/4/2015	2/20/2015	12+1					5.5	ANTERIOR	14.1	3.11	
155	SHANTHI	26	5122116589	G2P1L1	7/10/2014	4/17/2015	2/20/2015	32+2	85.0	296	282	66.1		POSTERIOR	31.5	2.59	
156	PUSHPALATHA	26	5122986456	G2P1L1	8/13/2014	5/20/2015	2/23/2015	27+5	68.9	250	219	51.4		ANTERIOR	29.2	3.31	
157	ALAMELU	29	5117894325	G4P1L1A2	9/7/2014	6/14/2015	2/24/2015	24+2	53.8	226	198	41.0		POSTERIOR	24	2.62	
158	KALIYAMMAL	33	5137354679	G3P1L0A1	6/29/2014	4/6/2015	2/25/2015	34+3	83.2	302	283	65.4		ANTERIOR	33	2.63	
159	MALINI	23	5117865092	G3A2	8/10/2014	5/17/2015	2/25/2015	28+3	66.7	258	232	55.0		ANTERIOR	28.1	2.87	
160	RAMALAKSHMI	40	5120567666	G2A1	8/11/2014	5/18/2015	2/25/2015	28+2	73.0	260	262	54.1		ANTERIOR	29	2.76	
161	DEEPAKAMALINI	30	5113492659	G3P1L1A1	6/23/2014	3/30/2015	2/26/2015	35+3	85.0	309	340	69.1		ANTERIOR	34.3	2.63	1
162	MEENA	31	5116648026	G2P1L1	12/1/2014	9/8/2015	2/26/2015	12+3					5.9	POSTERIOR	14.7	2.56	
163	RADHA	28	5123344268	G2P1L1	6/25/2014	4/2/2015	2/26/2015	35+0	81.0	312	329	67.0		POSTERIOR	36	3.39	
164	VARALAKSHMI	30	5121804178	G2P1L1	8/29/2014	6/5/2015	2/26/2015	25+5	65.4	236	213	51.2		ANTERIOR	23.6	2.65	
165	VINODHINI	23	5127654890	PRIMI	7/2/2014	4/9/2015	2/27/2015	34+2	81.5	304	276	68.7		POSTERIOR	34	3.42	
166	RAJESWARI	23	5121070695	PRIMI	8/29/2015	6/5/2015	2/27/2015	25+6	67.1	239	234	52.4		ANTERIOR	24.1	2.81	
167	TARUNA	32	5111226789	G2P1L1	6/18/2014	3/25/2015	2/27/2015	36+2	85.0	312	304	67.0		POSTERIOR	35.1	2.86	
168	RAMYA	26	5122453789	G2P1L1	7/10/2014	4/17/2015	2/27/2015	33+2	79.0	306	281	62.0		ANTERIOR	34.4	2.77	
169	SELVAKUMARI	31	5135642345	G3P2L2	9/4/2014	6/11/2015	2/28/2015	25+2	65.0	240	217	50.3		POSTERIOR	24.9	2.97	
170	THENMOZHI	23	5123814420	G2P1L1	10/9/2014	7/17/2015	2/28/2015	20+2	54.7	179	145	35.4		FUNDAL	19.7	2.96	
171	MOHANA	28	5115821841	G2P1A1	9/9/2014	6/16/2015	3/1/2015	25+1	62.5	249	196	45.5		FUNDAL	26.2	2.95	
172	MARIA	21	5122864568	PRIMI	6/18/2014	3/25/2015	3/2/2015	36+5	93.9	316	286	74.1		ANTERIOR	36.2	2.93	

173	VENILA	19	5115062732	G2P1L1	12/8/2014	9/15/2015	3/2/2015	12+0					5.5	ANTERIOR	14.1	2.91	
174	VIJAYALAKSHMI	25	5121322704	PRIMI	9/18/2014	6/25/2015	3/2/2015	23+4	61.0	216	210	49.0		ANTERIOR	23.1	2.88	
175	PORKODI	20	5113356648	G3P2L2	8/25/2014	6/1/2015	3/3/2015	26+1	72.0	257	214	46.8		POSTERIOR	26.5	2.85	
176	ROSEMARY	30	5123267373	G2P1L1	7/16/2014	4/23/2015	3/3/2015	32+6	87.0	299	304	68.0		POSTERIOR	31.7	3.38	
177	MANJU	31	5120667548	G2P1L1	6/11/2014	3/18/2015	3/4/2015	37+3	89.0	320	340	71.2		POSTERIOR	35.9	3.31	
178	SUGANYA	23	5122027123	G2P1L1	9/11/2014	6/18/2015	3/4/2015	24+4	59.0	190	192	38.9		ANTERIOR	23.1	2.82	
179	USHA	23	5123656890	PRIMI	6/25/2014	4/2/2015	3/4/2015	36+0	89.0	318	322	70.0		ANTERIOR	35.7	3.42	
180	YASODHA	21	5122897656	PRIMI	6/28/2014	4/5/2015	3/4/2015	35+4	83.4	314	302	66.9		POSTERIOR	35.2	3.28	
181	KOMALA	30	5122445368	G3P1L1A1	7/29/2014	5/5/2015	3/5/2015	31+2	72.0	286	270	59.0		ANTERIOR	31.5	3.38	
182	CHITRA	23	5120675478	PRIMI	6/20/2014	3/27/2015	3/5/2015	36+0	88.6	323	323	71.1		POSTERIOR	36	3.33	
183	TAMILSELVI	30	5117037681	PRIMI	9/2/2014	6/9/2015	3/5/2015	26+1	61.3	259	186	43.7		ANTERIOR	25.7	2.81	
184	SASIKALA	24	5117459483	PRIMI	7/17/2014	4/24/2015	3/6/2015	33+0	85.3	307	287	62.8		POSTERIOR	33.3	2.64	
185	KANNIGA	28	5113264579	G3P2L2	9/4/2014	6/11/2015	3/7/2015	26+2	62.4	239	196	45.5		ANTERIOR	26	2.79	
186	RAJESWARI	26	5122129180	G2P1L1	10/11/2014	7/18/2015	3/8/2015	21+1	51.2	189	168	36.5		POSTERIOR	20.8	2.75	
187	MEENATCHI	28	5111226547	G2P1L1	7/20/2014	4/27/2015	3/9/2015	33+1	87.0	309	299	65.0		ANTERIOR	32.8	3.35	
188	RUPA	21	5116723910	PRIMI	10/3/2014	7/10/2015	3/10/2015	22+4	52.4	178	187	41.2		ANTERIOR	23.1	2.72	
189	BIMALA DEVI	28	5123908876	G3P1L1A1	9/2/2014	6/9/2015	3/10/2015	27+0	65.8	257	220	52.4		ANTERIOR	27	2.71	
190	SINDHU	24	5122306029	PRIMI	6/21/2014	3/28/2015	3/10/2015	37+3	94.4	327	340	73.6		POSTERIOR	35.8	2.69	
191	AKSHAYA	21	5342886077	PRIMI	10/7/2014	7/14/2015	3/11/2015	22+1	56.5	196	198	35.4		POSTERIOR	24.3	2.66	
192	JAYA	30	5114627269	G3P1L1A1	7/21/2014	4/28/2015	3/11/2015	33+2	83.9	312	296	67.8		ANTERIOR	33.1	2.63	
193	SARITHA	22	5113690527	PRIMI	9/12/2014	6/19/2015	3/11/2015	25+5	62.4	246	196	45.5		POSTERIOR	26	2.61	
194	SELVAM	27	5122876690	G2P1L1	6/12/2014	3/19/2015	3/11/2015	38+6	93.0	327	320	70.2		LATERAL	37.1	2.59	
195	SUSHEELA	33	5117865435	PRIMI	6/27/2014	4/4/2015	3/12/2015	36+6	89.0	326	319	72.0		LATERAL	35.9	2.88	
196	EZHUNAIRU	26	5122490967	PRIMI	10/2/2014	7/9/2015	3/12/2015	23+0	55.0	219	194	40.6		POSTERIOR	20.8	2.56	
197	SARANYA	28	5125478957	PRIMI	9/1/2014	6/8/2015	3/12/2015	27+4	67.8	261	225	53.0		FUNDAL	28.3	3.1	
198	SOUMYA	31	5121477990	G3P1L1A1	8/23/2014	5/30/2015	3/12/2015	28+5	74.0	263	254	57.0		ANTERIOR	27.9	3.38	
199	NALINI	24	5116558434	PRIMI	6/5/2014	3/12/2015	3/12/2015	40+0	96.6	329	333	78.1		ANTERIOR	39.1	3.46	
200	KUMUDHA	32	5122673490	G2P1L1	6/18/2014	3/25/2015	3/12/2015	38+1	93.0	329	330	76.0		LATERAL	37.4	2.71	
201	KANIMOZHI	29	5122557658	G2P1L1	8/18/2014	5/25/2015	3/13/2015	29+3	74.4	274	270	56.0		ANTERIOR	29.8	3.32	

202	KANIMOZHI	27	5122784567	PRIMI	8/26/2014	6/2/2015	3/13/2015	27+3	70.7	266	243	51.3		POSTERIOR	27.7	3.41	
203	RADHA	29	5122099657	G2P1L1	8/5/2014	5/12/2015	3/14/2015	31+4	78.6	289	268	61.4		LATERAL	31.2	3.19	
204	TAMARAI SELVI	19	5115564779	PRIMI	7/11/2014	4/18/2015	3/15/2015	35+2	83.0	317	298	66.6		ANTERIOR	35.2	2.54	
205	SUGANTHI	32	5115642387	G2P1L1	8/8/2014	5/15/2015	3/16/2015	31+3	78.7	295	269	63.0		LATERAL	30.8	2.95	
206	NIRMALA	24	5123614933	G4A3	9/28/2014	7/4/2015	3/16/2015	22+5	58.7	190	197	37.3		POSTERIOR	24.1	3.28	
207	PARVATHI	26	5133427690	G2A1	7/25/2014	5/2/2015	3/17/2015	33+4	81.7	314	301	63.8		FUNDAL	31.4	3.39	
208	KRISHNAVENI	21	5122887694	PRIMI	6/18/2014	3/25/2015	3/17/2015	38+6	95.4	330	341	73.8		POSTERIOR	37.8	3.39	
209	VARALAKSHMI	26	5122985647	PRIMI	9/3/2014	6/10/2015	3/17/2015	27+6	67.7	269	219	52.8		POSTERIOR	28.4	3.37	
210	SHALINI	22	5112273345	PRIMI	8/24/2014	5/31/2015	3/18/2015	29+3	73.0	276	261	61.0		ANTERIOR	30.2	3.41	
211	LAKSHMI	32	5111350556	G3P1L1A1	10/16/2014	7/23/2015	3/18/2015	21+6	54.5	196	170	38.9		ANTERIOR	21.1	3.33	
212	LAKSHMI	32	5121778954	PRIMI	6/11/2014	3/18/2015	3/18/2015	40+0	96.4	335	329	74.2		POSTERIOR	38.7	2.76	
213	PREMA	30	5123567498	G2P1L1	7/14/2014	4/21/2015	3/18/2015	35+2	81.7	319	290	64.5		ANTERIOR	35	3.37	
214	MEENA	27	5121446880	G2P1L1	6/12/2014	3/19/2015	3/19/2015	40+0	90.0	360	362	76.0		LATERAL	38.9	2.83	
215	MURUGAVALLI	26	5112895643	G3P1L1A1	7/13/2014	4/20/2015	3/20/2015	35+5	82.1	320	296	66.8		ANTERIOR	34	3.36	
216	REGINA	28	5113556748	G2P1L1	7/24/2014	5/1/2015	3/21/2015	34+2	86.8	306	288	64.9		ANTERIOR	34.1	2.52	
217	ANITHA DEVI	25	5133549708	PRIMI	9/8/2014	6/15/2015	3/21/2015	25+5	65.4	249	214	52.1		POSTERIOR	25	3.47	
218	ANBARASI	31	5123487609	G2P1L1	7/17/2014	4/24/2015	3/23/2015	35+3	87.0	325	307	71.0		ANTERIOR	36.8	3.39	
219	VASANTHI	25	5117079263	G2P1L1	10/25/2014	8/1/2015	3/23/2015	21+2	53.3	176	167	34.8		POSTERIOR	22.4	2.57	
220	KALA	33	5153454278	G3P1L0A1	6/29/2014	4/6/2015	3/24/2015	38+2	93.0	333	364	73.0		ANTERIOR	38.1	3.41	
221	KAMARUNISHA	28	5117854367	PRIMI	7/21/2014	4/28/2015	3/24/2015	35+1	80.0	328	288	64.0		POSTERIOR	34.8	2.79	
222	JAYASATHYA	29	5116833969	G2P11L1	10/10/2014	7/17/2015	3/24/2015	23+3	59.1	223	198	46.8		ANTERIOR	22.1	3.18	
223	RANI	24	5122338799	PRIMI	6/21/2014	3/28/2015	3/24/2015	39+3	96.0	335	368	74.0		POSTERIOR	38.5	3.18	
224	VIMALA	23	5122564897	G2P1L1	9/4/2014	6/11/2015	3/25/2015	29+0	73.5	278	274	53.4		LATERAL	29	2.9	
225	ARULJYOTHI	26	5123675489	PRIMI	9/2/2014	6/9/2015	3/26/2015	28+2	73.0	266	262	54.1		LATERAL	29	3.47	
226	NANDHINI	24	5122249876	PRIMI	9/12/2014	6/19/2015	3/27/2015	27+0	64.7	270	214	47.8		FUNDAL	24.5	3.34	
227	MARYLEENE	30	5117149579	PRIMI	10/1/2014	7/8/2015	3/27/2015	25+2	68.7	214	234	56.0		ANTERIOR	24.4	3.21	
228	SONIA	35	5122569087	G5P1L1A3	8/23/2014	5/30/2015	3/27/2015	30+6	76.4	282	256	57.8		ANTERIOR	31	3.45	
229	BHAVANI	25	5124185678	PRIMI	9/10/2014	6/17/2015	3/28/2015	28+3	73.4	269	270	54.2		ANTERIOR	28	3.29	
230	KALAIVANI	28	5121620434	G2P1L1	10/21/2014	7/28/2015	3/28/2015	22+4	49.0	176	160	32.1		POSTERIOR	23	3.42	

231	VINITHA	25	5124436675	PRIMI	8/27/2014	6/3/2015	3/28/2015	30+3	76.0	284	258	57.0		POSTERIOR	29.6	2.63	
232	AARTHI	29	5120768988	PRIMI	8/30/2014	6/6/2015	3/30/2015	27+2	70.1	272	237	49.0		POSTERIOR	26.8	3.42	
233	SHANTAKUMARI	26	5151514690	PRIMI	8/20/2014	5/27/2015	4/1/2015	32+0	78.0	301	268	60.0		ANTERIOR	32	3.96	
234	RENUKA	21	5116249076	PRIMI	6/28/2014	4/5/2015	4/1/2015	39+4	89.7	346	319	72.7		ANTERIOR	38.7	3.12	
235	USHA	21	5122453178	PRIMI	9/1/2014	6/8/2015	4/2/2015	30+4	76.3	288	257	53.1		POSTERIOR	29.1	3.18	
236	VIDHYA	31	5116453478	G3P2L2	9/4/2014	6/11/2015	4/4/2015	30+2	74.3	290	229	51.7		POSTERIOR	31.7	3.28	
237	SUGANYA	25	5115547793	PRIMI	11/7/2014	8/14/2015	4/4/2015	21+1	51.2	181	163	36.5		POSTERIOR	21.1	3.14	
238	JAYASEELA	26	5127864539	G2A1	7/25/2014	5/2/2015	4/6/2015	36+3	87.4	329	347	68.9		ANTERIOR	35.2	3.28	
239	KOTHAINAYAGI	25	5114367584	G2P1L1	8/1/2014	5/8/2015	4/6/2015	34+3	86.6	309	286	64.8		ANTERIOR	34.6	3.39	
240	DEIVANAYAGI	30	5114653898	G3P1L1A1	7/21/2014	4/28/2015	4/7/2015	37+1	90.0	330	296	63.4		POSTERIOR	36.3	3.25	
241	DEEPA	31	5122254738	G2P1L1	8/26/2014	6/2/2015	4/7/2015	32+0	78.1	304	269	60.4		ANTERIOR	32.2	2.35	
242	LAVANYA	21	5120986547	PRIMI	9/3/2014	6/10/2015	4/7/2015	30+6	78.8	297	279	60.7		POSTERIOR	32.5	3.19	
243	RAJALAKSHMI	24	5123564805	G2P1L1	10/7/2014	7/14/2015	4/7/2015	26+0	65.4	245	207	48.7		ANTERIOR	27.9	3.48	
244	REKHA	23	5122415899	PRIMI	9/16/2014	6/23/2015	4/7/2015	23+1	56.0	226	156	39.0		POSTERIOR	24.1	3.38	
245	SHEENE	32	5114356789	G2P1L1	7/15/2014	4/22/2015	4/8/2015	38+0	93.2	338	358	71.4		ANTERIOR	38	3.89	
246	KANNIKA	30	5120050996	G2P1L1	8/15/2014	5/22/2015	4/10/2015	34+0	83.2	312	285	66.3		POSTERIOR	34	3.2	
247	SARASU	29	5126578437	G3P1L1A1	9/4/2014	6/11/2015	4/11/2015	31+5	79.0	297	247	61.7		POSTERIOR	29	3.33	
248	CHANDRA	28	5136845368	G3P2L2	9/4/2014	6/11/2015	4/11/2015	31+2	78.7	301	237	61.7		POSTERIOR	30.9	3.37	
249	GEETHALAKSHMI	28	5114446578	G3P1L1A1	7/22/2014	4/29/2015	4/11/2015	37+4	89.0	337	319	69.0		LATERAL	36.9	3.12	
250	KANAGA	24	5116015218	G2P1L1	10/17/2014	7/24/2015	4/12/2015	25+2	68.7	228	234	56.0		ANTERIOR	24.1	3.26	
251	AMALA MARY	20	5121256746	G3P1L1A1	8/27/2014	6/3/2015	4/12/2015	32+4	78.0	306	270	62.0		ANTERIOR	32	3.31	
252	ARULMOZHI	29	5152468906	PRIMI	7/22/2014	4/29/2015	4/13/2015	37+6	90.0	349	300	70.7		POSTERIOR	37.1	3.38	
253	KALAIYARASI	23	5124083491	PRIMI	10/30/2014	8/6/2015	4/14/2015	23+2	58.7	229	186	42.3		ANTERIOR	25	3.46	
254	GEETHA	20	5133166547	G3P2L2	8/25/2014	6/1/2015	4/14/2015	32+1	81.0	310	260	62.4		POSTERIOR	31	3.39	
255	LATHA	35	5113454997	G2P1L1	10/4/2014	7/29/2015	4/14/2015	24+6	59.0	219	189	45.6		ANTERIOR	24.3	3.32	
256	VIDIVELLI	24	5118976540	PRIMI	8/28/2014	6/4/2015	4/14/2015	32+5	78.8	309	278	63.0		POSTERIOR	32.6	3.12	
257	SRUTHI PRAVEEN	22	5123269455	G2P1L1	10/28/2014	8/4/2015	4/14/2015	24+0	63.0	247	201	41.3		ANTERIOR	24.1	3.23	
258	MUTHU	25	5122675589	PRIMI	9/10/2014	6/17/2015	4/15/2015	31+0	68.7	303	249	51.2		ANTERIOR	29.7	3.34	
259	MANJULA	20	5120931122	G2P1L1	11/14/2014	8/21/2015	4/16/2015	21+6	54.5	192	165	38.9		POSTERIOR	22.1	3.29	

260	SUBATHRE	29	5111784456	G2P1L1	8/18/2014	5/25/2015	4/16/2015	34+3	83.4	315	280	65.8		POSTERIOR	34.3	3.19	
261	PARVATHI	23	5121314366	PRIMI	1/7/2015	10/14/2015	4/16/2015	14+1	28.6	97	143	15.4		POSTERIOR	15.7	3.42	
262	DEVIKA	23	5122768080	G2P1L1	9/1/2014	6/8/2015	4/16/2015	32+3	78.1	313	271	61.5		ANTERIOR	32.5	3.17	
263	AAMINA	25	5121654374	G2P1L1	11/8/2014	8/15/2015	4/20/2015	23+2	60.5	230	185	41.0		POSTERIOR	23	3.25	
264	JAYASHREE	29	5115665933	G3P2L2	11/15/2014	8/22/2015	4/20/2015	22+2	51.8	189	164	38.0		ANTERIOR	22.8	3.21	
265	RANJANI	28	5111654783	G2P1A1	9/9/2014	6/16/2015	4/21/2015	32+3	76.0	316	280	64.5		POSTERIOR	32.09	3.47	
266	SELVARANI	25	5120072180	G2P1L1	1/16/2015	10/23/2015	4/22/2015	13+5					7.4	LATERAL	15.2	3.35	
267	VIMALA DEVI	28	5122986754	G3P1L1A1	9/2/2014	6/9/2015	4/22/2015	33+1	82.9	316	310	63.8		POSTERIOR	33	3.25	
268	VEENA	27	5120678978	G3P1L1A1	9/13/2014	6/20/2015	4/24/2015	31+6	79.0	306	240	60.0		ANTERIOR	29.1	2.34	
269	PRAMILA	29	5122564907	G2P1L1	8/5/2014	5/12/2015	4/25/2015	37+4	89.8	342	309	68.9		POSTERIOR	36.8	3.34	
270	MAHALAKSHMI	29	5115478872	G2P1L1	10/14/2014	7/22/2015	4/26/2015	27+5	71.6	275	254	51.4		ANTERIOR	27.2	3.25	
271	SARASWATHI	32	5111768960	PRIMI	9/9/2014	6/16/2015	4/27/2015	32+6	78.7	289	291	68.7		POSTERIOR	33.1	3.17	
272	PRIYA	29	5123713830	PRIMI	10/21/2014	7/28/2015	4/28/2015	27+0	64.7	244	214	47.8		ANTERIOR	24.5	3.19	
273	SAVITHRI	33	5113447889	G3P1L1A1	10/15/2014	7/22/2015	4/28/2015	27+6	71.6	239	254	51.4		POSTERIOR	27.2	3.12	
274	UMA	24	4938122127	PRIMI	11/11/2014	8/18/2015	4/28/2015	24+1	64.5	218	223	42.5		LATERAL	24.3	3.26	
275	YUVARANI	26	5117334413	PRIMI	11/18/2014	8/25/2015	4/28/2015	23+0	55.0	235	194	40.6		POSTERIOR	20.8	3.29	
276	MATHURIDEVI	21	5114434983	PRIMI	11/26/2014	9/2/2015	4/29/2015	22+0	54.3	190	178	32.4		ANTERIOR	20.5	3.14	
277	SWATHI	27	5113978522	G2P1L1	9/5/2014	6/12/2015	4/29/2015	25+0	59.0	223	198	48.7		POSTERIOR	27	3.09	
278	BANUMATHY	29	5120097658	PRIMI	8/30/2014	6/6/2015	4/29/2015	31+4	76.7	308	243	59.0		ANTERIOR	29.3	3.39	
279	NIRMALA	26	5123756478	PRIMI	9/2/2014	6/9/2014	4/30/2015	33+2	81.8	318	272	68.0		ANTERIOR	33.2	3.37	
280	PRAVEENA	29	5126794536	G4P1L1A2	9/7/2014	6/14/2015	4/30/2015	33+4	82.5	319	264	61.4		POSTERIOR	33	3.18	
281	BAKKIYAM	22	5135689769	PRIMI	9/12/2014	6/19/2015	4/30/2015	32+6	78.0	294	267	60.0		POSTERIOR	32.4	3.43	
282	MUTHAMMAL	23	5121678945	PRIMI	8/29/2015	6/5/2015	5/2/2015	35+2	80.1	329	287	61.1		ANTERIOR	35.1	3.11	
283	RADHA	27	5121675589	G2P1L1	9/5/2014	6/12/2015	5/2/2015	34+0	81.4	319	318	62.3		POSTERIOR	34.6	3.25	
284	LAVANYA	30	5111465387	PRIMI	9/2/2014	6/9/2015	5/2/2015	34+3	87.0	318	326	69.1		POSTERIOR	35.2	3.22	
285	UMAVATHI	24	5122277658	PRIMI	9/12/2014	6/19/2015	5/4/2015	32+3	76.0	297	280	64.5		ANTERIOR	32.09	3.39	
286	EZHILARASI	25	5114789653	G2P1L1	8/1/2014	5/8/2015	5/4/2015	38+3	92.3	342	354	70.1		ANTERIOR	37.3	3.27	
287	DEEPA	25	5116756890	PRIMI	9/8/2014	6/15/2015	5/4/2015	34+0	85.0	320	320	67.0		POSTERIOR	34.4	3.21	
288	SAVITRI DEVI	25	5124208418	G2P1L1	11/18/2014	8/25/2014	5/4/2015	23+6	58.0	238	173	42.0		ANTERIOR	23.7	3.62	

289	VANI	21	5134256347	PRIMI	9/1/2014	6/8/2015	5/5/2015	35+2	81.0	332	334	67.3		POSTERIOR	35.3	3.54	
290	NITHYA	27	5121553832	PRIMI	11/2/2014	8/9/2015	5/5/2015	26+2	71.0	248	196	45.5		ANTERIOR	26	3.45	
291	PREMALATHA	18	5115987346	PRIMI	9/4/2015	6/11/2015	5/6/2015	34+6	84.1	324	327	64.3		POSTERIOR	32.7	3.25	
292	PADMINI	35	5122786906	G5P1L1A3	8/23/2014	5/30/2014	5/6/2015	36+4	88.5	333	314	67.2		ANTERIOR	36.5	3.19	
293	KOTTESWARI	37	5117634789	G3P1L1A1	9/15/2014	5/22/2015	5/7/2015	33+1	82.0	320	305	63.8		POSTERIOR	33.2	2.2	1
294	LALITHA	29	5118234562	G3P1L1A1	9/4/2014	6/11/2015	5/8/2015	35+4	83.1	335	317	68.0		ANTERIOR	34.7	3.16	
295	FATHIMA	27	5122897608	PRIMI	8/26/2014	6/2/2015	5/10/2015	35+0	81.7	338	303	69.0		POSTERIOR	34.7	3.32	
296	MARIAMMAL	28	5115876490	G2P1A1	9/9/2014	6/16/2015	5/12/2015	35+3	82.8	339	312	61.2		ANTERIOR	34.3	3.29	
297	MEKALA	29	5116756785	G2P11L1	10/10/2014	7/17/2015	5/15/2015	30+5	76.5	294	256	56.4		POSTERIOR	29.2	3.12	
298	GIRIJA	30	5111237890	G2P1L1	8/29/2014	6/5/2015	5/15/2015	36+0	89.0	338	321	70.1		ANTERIOR	36.3	3.38	
299	ANJALI	24	5116785446	G2P1L1	10/17/2014	7/24/2015	5/16/2015	30+1	75.1	292	264	62.7		POSTERIOR	32	3.67	
300	PREMA	28	5124674578	PRIMI	9/1/2014	6/8/2015	5/16/2015	36+6	88.0	345	347	68.4		POSTERIOR	36	3.81	
301	PREMA	35	5113487698	G2P1L1	10/4/2014	7/29/2015	5/18/2015	29+5	75.3	281	243	57.6		LATERAL	30.9		
302	USHA	23	5123786905	G2P1L1	10/9/2014	7/17/2015	5/18/2015	31+4	78.6	279	245	58.7		POSTERIOR	30	3.58	
303	SUMITHRA	29	5114378453	G2P1L1	10/14/2014	7/22/2015	5/20/2015	31+1	75.0	281	247	54.3		FUNDAL	31.7		
304	LATHA	32	5111176895	PRIMI	9/9/2014	6/16/2015	5/20/2015	36+1	85.4	347	347	61.7		POSTERIOR	36.7		
305	SANGAMITRA	22	5121187650	PRIMI	9/12/2014	6/19/2015	5/21/2015	35+6	84.8	341	306	65.6		POSTERIOR	36		
306	RATHI	22	5123146784	G2P1L1	10/28/2014	8/4/2015	5/21/2015	29+2	75.4	284	289	56.0		ANTERIOR	30.1	3.34	
307	NEHA	23	5122099765	G2P1L1	9/11/2014	6/18/2015	5/21/2015	35+6	84.8	340	306	65.6		ANTERIOR	36	3.38	
308	MANJULA	24	5122769076	G4A3	9/28/2014	7/4/2015	5/22/2015	32+2	74.3	300	257	65.3		POSTERIOR	32.7	3.44	
309	VETRI	24	5127677046	PRIMI	8/28/2014	6/4/2015	5/24/2015	38+5	92.3	346	354	70.0		POSTERIOR	37.9		
310	RENUKA	22	5112257668	PRIMI	8/24/2014	5/31/2015	5/25/2015	39+1	94.4	356	349	75.4		ANTERIOR	38.8	3.32	
311	SANDHYA	28	5121765980	G2P1L1	10/21/2014	7/28/2015	5/26/2015	31+0	68.7	283	256	51.2		POSTERIOR	29.5	3.37	
312	FOUZAL	25	5122876097	PRIMI	9/18/2014	6/25/2015	5/27/2015	35+6	84.8	321	306	65.6		ANTERIOR	36	3.39	
313	INDIRA	32	5113476804	G3P1L1A1	10/16/2014	7/23/2015	5/28/2015	32+0	81.0	302	260	62.4		POSTERIOR	31.3	2.35	
314	KALYANI	21	5116785435	PRIMI	10/3/2014	7/10/2015	5/28/2015	33+6	87.9	325	298	64.5		ANTERIOR	34.5	2.4	
315	NISHA	25	5111557689	PRIMI	11/7/2014	8/14/2015	5/28/2015	28+6	71.3	271	231	54.5		POSTERIOR	27.3		
316	ALLIRANI	20	5120978659	G2P1L1	11/14/2014	8/21/2015	5/30/2015	28+1	68.7	273	213	53.4		ANTERIOR	26.9	3.19	
317	SANTOSH MARY	33	5116548905	G3P1L1A1	10/15/2014	7/22/2015	6/1/2015	32+5	78.9	296	287	65.4		ANTERIOR	33.3	2.32	

318	VENGAMMAL	25	5116896540	PRIMI	9/8/2014	6/15/2015	6/2/2015	35+6	84.8	325	306	65.6		POSTERIOR	36		
319	GOGILA	19	5112789456	G2P1L1	12/8/2015	9/15/2015	6/2/2015	25+1	62.5	229	196	45.5		POSTERIOR	25.1		
320	KALPANA	25	5113452345	PRIMI	9/10/2014	6/17/2015	6/4/2015	38+1	92.2	351	350	71.2		ANTERIOR	38.3	3.58	
321	LAKSHMI	26	5122445367	PRIMI	10/2/2014	7/9/2015	6/6/2015	35+2	82.2	328	310	69.5		POSTERIOR	33.8	3.35	
322	BINDU	26	5117745224	PRIMI	11/18/2014	8/25/2015	6/6/2015	28+4	70.1	277	234	56.3		ANTERIOR	27.1		
323	PADMAVATHY	23	5124456378	PRIMI	10/30/2014	8/6/2015	6/7/2015	30+6	78.1	302	273	56.3		POSTERIOR	32.9	3.87	
324	VALARMATHI	21	5345236743	PRIMI	10/7/2014	7/14/2015	6/13/2015	31+1	75.0	290	263	54.3		ANTERIOR	31.7	3.97	
325	SARITHA	24	5122566789	PRIMI	11/11/2014	8/18/2015	6/15/2015	31+0	74.4	295	248	54.6		POSTERIOR	30.8		
326	DHANYA	24	5122467894	G2P1L1	10/7/2014	7/14/2015	6/16/2015	32+0	78.0	297	268	60.0		POSTERIOR	32	3.31	
327	BHAVANI	29	5123876590	PRIMI	10/21/2014	7/28/2015	6/22/2015	34+6	84.1	326	327	64.3		ANTERIOR	31.9	3.32	
328	ARUNA	26	5122567845	G2P1L1	10/11/2014	7/18/2015	6/22/2015	36+2	94.8	340	336	73.4		POSTERIOR	35.3	3.37	
329	GUNAMANAM	21	5122447564	PRIMI	11/26/2014	9/2/2015	6/23/2015	29+6	78.7	287	287	59.8		ANTERIOR	29		
330	KAVERI	30	5117123786	PRIMI	10/1/2014	7/8/2015	6/24/2015	38+0	89.7	355	332	69.8		POSTERIOR	37.6		
331	RASATHI	27	5122876549	PRIMI	11/2/2014	8/9/2015	7/6/2015	35+1	80.0	326	288	64.0		ANTERIOR	34.8	3.35	
332	SAMPATHA	25	5111457789	PRIMI	11/7/2014	8/14/2015	7/7/2015	34+4	81.7	328	276	63.2		POSTERIOR	32.9		
333	AMUDHA	25	5123457869	G2P1L1	11/8/2014	8/15/2015	7/15/2015	35+4	84.3	333	324	71.0		ANTERIOR	34.2	3.39	